



DR. GEO. EDWIN HUNT



Bacteriology in its Relationship to the Oral and Nasal Cavities.

By JOHN BETHUNE STEIN, M.D.
*Professor of Physiology and Histology at the New York College
of Dentistry, New York.*

IV.

The Treponema Pallidum (*Spirochæta Pallida*) (*Fig. 43 and Fig. 44, No. 7*), discovered in 1905 by Schaudinn, is the causal agent of syphilis. It can be found in the chancre and the adenopathies accompanying the same, in the secondary manifestations of the disease (mucous patches, papules, roseola, etc.) and in the blood of the general circulation (Raubitschek, Noeggerath and Staehelin, Flugel, Nottan-Larrier, Bergeron). Tertiary syphilis is said to be clinically not infectious, but the Treponema has been encountered in tertiary lesions. Finger, Landsteiner, Neisser and Hoffmann have succeeded in infecting apes with fragments of gummata; Hoffmann infected them with the blood from a patient with tertiary syphilis; Tomaszewski, Rille and Vockerodt have seen the Treponema Pallidum in papular tertiary lesions and Spitzer, Doutrelepont, Grouven and Dudgeon have met it in gummata. Treponemata Pallida have been found also in the wall of the aorta in syphilitic aoritis. Noguchi and Moore have demonstrated the Treponema Pallidum in the brains of cases of general paralysis, and it has been

demonstrated by Noguchi in the spinal cord of a case of locomotor ataxia. It is in the lesions of heredosyphilis that the Treponema Pallidum is found in the greatest numbers. It may be encountered in any organ and may be present within the ova and in the placenta. It can wander between

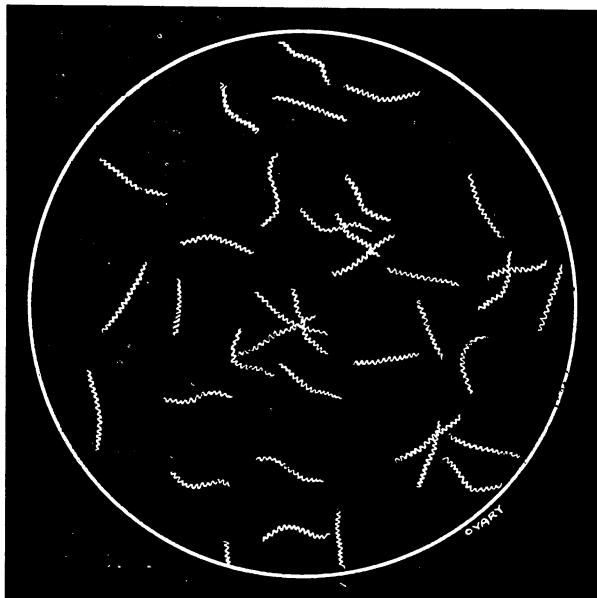


Fig. 43. The Treponema Pallidum as it appears under the Dark-Field Microscope.

the epithelial cells of the skin and mucous membranes, and it is almost always present in the mucus from the mouth, tonsils, pharynx and nose of heredosyphilitics. Hoffmann produced syphilis in an ape by inoculating it with the nasal mucus from a syphilitic man. This spirochæta can be found in the urine of those having syphilitic nephritis, and has been found in the milk and semen of syphilitics. In 1903, Roux and Metchnikoff demonstrated that anthropoid apes were susceptible to syphilis. Syphilis, however, is not so easily generalized in animals as in man. It is possible to produce a syphilitic keratitis and orchitis in a rabbit and a keratitis in a guinea pig; to infect the cat, dog and sheep through the cornea, and Siegel has produced syphilis in a two-days-old mouse by a subcutaneous inoculation of syphilitic material. The Treponema Pallidum can be differentiated from the other spirochætae by sev-

eral characteristics. It is pale, with little refringence; has an average length of about 10 to 15 micra; its thickness is only 0.25 of a micron; it has no undulating membrane, is circular in transverse section and has finely pointed ends. The spiral or cork-screw-like form is constantly

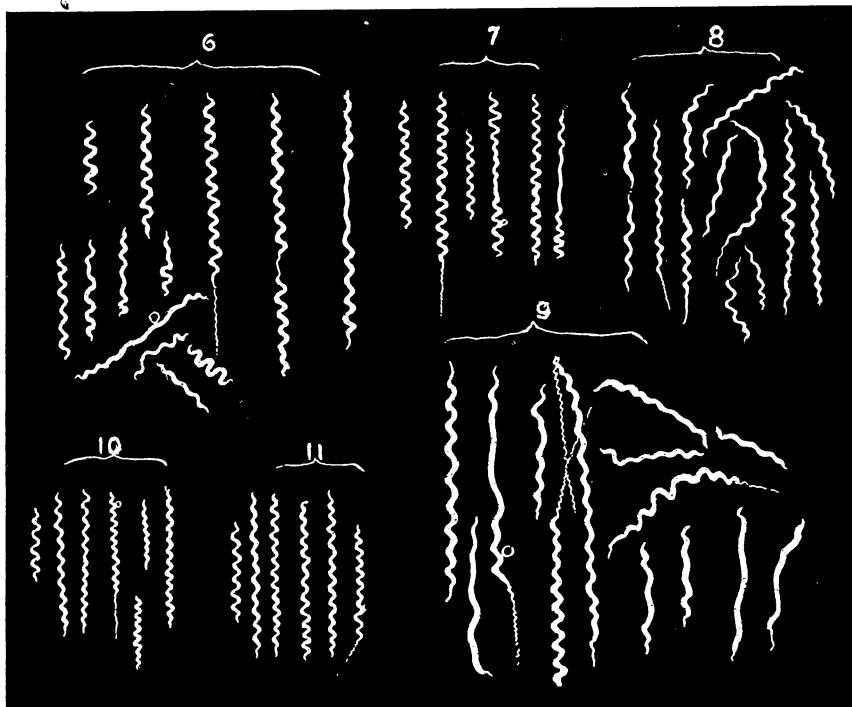


Fig. 44. Schematic Reproduction of Dark-Field Views of Various species of *Treponema* in Pure Culture: (6) *Treponema Calligryrum*; (7) *Treponema Pallidum*; (8) *Treponema Macrodentium*; (9) *Spirochæta Refrigens*; (10) *Treponema Microdentium*; (11) *Treponema Mucosum*.
(From Noguchi.)

maintained by the spirochaeta, both while resting or moving. The turns of the spirals are deep, regular, close together, and vary from 6 to 12 and may even be 26 in number. It is also markedly elastic and not easily deformed. In vitro its vitality is considerable, its movements usually ceasing only in five or six hours at room temperature. By evaporation of the medium containing the *Treponemata Pallida* they are killed quickly, but if the cover glass of a preparation is sealed to the slide with vaseline they may continue their movement for upwards of 33 days (Beers). Gaston and Commandion have found the *Treponemata Pallida* on a drinking glass after the glass had been immersed in water half an hour.



The *Treponema Pallidum*, which is difficult to stain and is colored red by Giemsa, moves by rotation around its long axis, comparatively slowly, at times forwards; sometimes it stops and may move in the opposite direction. There are also undulatory and flexion movements. The movement of the other spirochætae, except the *Treponema microdentium*, is for the most part sinuous or snakelike; there is also a tendency to lengthen their spirals during rest.

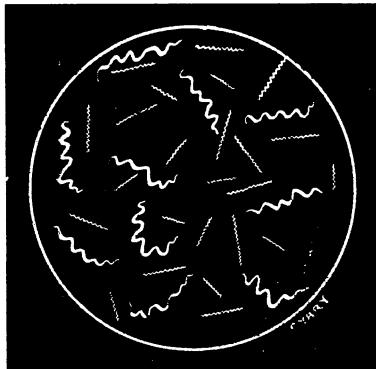


Fig. 45. The *Treponema Microdentium* and *Spirochæta Buccalis* as they appear under the Dark-Field Microscope.

The *Treponema Pallidum*, which is anaërobic, has been successfully cultivated by Mühlens, Hoffmann, Noguchi, and others. The cultures of this micro-organism produce no odor or mucin and its specificity has been demonstrated by the fulfillment of all the conditions of Koch's law.

The *Spirochæta Refringens* (Fig. 44, No. 9) is found in smegma and in ulcerated lesions of the skin, and may be associated with the *Treponema pallidum* in syphilitic lesions, but is usually met with on the surface of the lesion and not in the deeper part where the *Treponema Pallidum* is found. The *Spirochæta Refringens* is thicker and longer, and when alive very refringent and presents a number of broad, irregular open curves. It often appears to have a membrane and a flagellum attached laterally to the end, and its movement is much more rapid than that of the pallidum and not easy to follow under the microscope. This organism is easy to stain and is colored blue with Giemsa.

**Spirochæta
Balanitidis.**

It presents at times two flagella at one of its ends (Levaditi).

**Spirochæta
Dentium.**

The Spirochæta Dentium, Koch (1877), Miller (1892), well named by Noguchi the Treponema Microdentium (Fig. 44, No. 10, and Fig. 45), is found in the mouth, especially at the margins of the gums and in the cavities of carious teeth, and is more likely to be mistaken for the Treponema pallidum than any other micro-organism. The spiral form, as in the Treponema pallidum, persists in this micro-organism even during rest. It further resembles the Treponema pallidum by being pale, with little refringence, with its spirals close together and very regular, but with the curves not so high as the Treponema pallidum. The average length of this spirochæta is about 4 to 10 micra. It presents a flagellum at one of its extremities, and has been successfully cultivated. Grown on Noguchi's medium, the Treponema Microdentium (Spirochæta Dentium) produces a putrefactive odor, whereas the cultures of the Treponema pallidum grown on the same medium are odorless. This micro-organism is more easily stained than the Treponema pallidum.

**Spirochæta
Buccalis.**

The Spirochæta Buccalis (Fig. 45), which differs from that which comes from pyorrhœa alveolaris or from the cultures of the Treponema mucosum, was first discovered by Cohn (1872) in the human mouth, and is thick and bulky, with elongated and irregular curves, presenting one or two flagella implanted on its end, similar to those on the Spirochæta refringens. Some consider the Spirochæta Buccalis and Spirochæta refringens identical. Noguchi, who has not succeeded in obtaining this micro-organism in pure culture, says: "The identity of these two spirochætae requires further study." A membrane said to be formed by the débris of the periplasm of the organism at times appears to be present.

**Spirochæta
Media.**

Spirochæta Media (middle form of Hoffmann and von Prowazek), named by Noguchi the Treponema Macrodentium (Fig. 44, No. 8), is a form between the Spirochæta microdentium and the Spirochæta buccalis. This micro-organism, with the Spirochæta buccalis, is found in the mucus about the tonsils and pharynx and in ulcerative stomatitis. Cultures of this organism, like the Treponema pallidum, produce no odor.

Tunnicliff has found a spirochæta in the nasal mucus of seven out

of thirty-two cases of rhinitis. In one case a pure culture of the spirillum was obtained from a frontal sinusitis.

Of the *Treponema Mucosum* (Noguchi, 1912)

Treponema (Fig. 44, No. 11), Noguchi says:

Mucosum.

"(1) A mucin-producing spirochæta has been obtained in pure culture from a case of pyorrhœa alveolaris. This organism is an independent species of the genus treponema, and, as it is recognized for the first time I propose for it the name, 'Treponema Mucosum.'

"(2) Morphologically, the mucosum is difficult to separate from the pallidum and microdentium, but, through its biological properties and animal reactions, it is easily differentiated from all the rest of the spirochætae.

"(3) The mucosum is not parasitic in the strict sense of the term, but exerts a certain pyogenous action when the tissue has been so injured by foreign substances as to enable it to survive.

"(4) The strong fetid odor in the discharge from pyorrhœa alveolaris is due, at least in part, to the presence of the mucosum in the affected tissue."

Löwenthal has demonstrated two species of Spirochæta in Ulcerated Cancers, viz., the Spirochæta Micro-Girata and the Spirochæta Löwenthalii. They differ markedly from the *Treponema pallidum*.

Spirochæta of Vincent and *Bacillus Fusiformis* of Vincent. The Spirochæta of Vincent (46) is associated with the *Bacillus Fusiformis* of Vincent, in Plaut-Vincent Angina and in lesions of nosocomial gangrene. It has the characteristic of the Spirochæta buccalis and may be confused with it. It is chiefly found in the mouth and may possibly be a saprophytic micro-organism in that locality. It stains blue with Giemsa. Pure cultures of the fusiform bacilli and spirochætae of the Vincent type produce the peculiar fetid odor of pyorrhœa alveolaris.

Larson and Barron report having isolated the *Bacillus Fusiformis* from the blood of the basilic vein, obtained twenty-four hours before death, from a patient who suffered from an extensive ulceration and necrosis of the upper jaw. The direct smears taken from the buccal ulcerations revealed spirilla and fusiform bacilli. In this case, both the Widal and Wassermann reactions were negative. This case appears to be the first recorded one of the isolation of the *Bacillus Fusiformis* from the blood stream.

Gerber is convinced that, aside from Vincent's angina, there is a series of inflammatory and ulcerated lesions of the mouth and pharynx which are caused by spirochætae, such as gingivitis, simple or mercurial

stomatitis, periosteal and peribuccal abscesses, scurvy and perhaps noma. He explains the genesis of these lesions through some general or local alteration in the mucous membrane by cold, poor nutrition, some systemic condition, mercurialization, etc. Spirochætae and the *Bacillus fusiformis* are always present in the crypts of the tonsils, on the tongue and at the margin of the gums; and, finding favorable soil present for their development, become pathogenic, destroy here and there the epithelium, especially on the tonsils, and produce ulcerations. These lesions so produced constitute a class of which the angina of Vincent is typical. They have the same etiology and an interesting common therapy, *i. e.*, are all said to be cured by salvarsan.

Plaut says he has seen the symbiosis of the *Bacillus fusiformis* of Vincent and the Spirochæta of Vincent not only in the Plaut-Vincent angina, but also in lesions of the skin and mucous membranes, viz., in cases of stomatitis, noma, syphilis, pyorrhea, chancroid and fetid bronchitis. He says it is often difficult to determine whether an ulcero-membranous angina is caused by the symbiosis of the *Bacillus fusiformis* and Spirochæta of Vincent or is a chancre of the tonsil, and a chancre of the tonsil may also at times be infected by the *Bacillus fusiformis* and Spirochæta of Vincent, when a diagnosis can be made only by finding the *Treponema pallidum*. A syphilitic angina can at times simulate a Plaut-Vincent one, but the symbiosis of the *Bacillus fusiformis* and the Spirochæta of Vincent is rare in such a case.

The *Bacillus fusiformis* and Spirochæta of Vincent may be found associated with the Klebs-Löffler bacillus. They are very frequently found in pyorrhea alveolaris, traumatic ulcerations following the extraction of a tooth or foreign body, in cancer, gangrene of the lungs, in bronchiectasia and in chronic bronchitis with foetid expectoration. Plaut says the treatment "par excellence" is salvarsan, either locally or intravenously.

Noguchi has obtained in pure culture a spirochæta which he calls the *Treponema Calligyrum* (a new species) (Fig 44, No. 6), from the surface of genital or anal syphilitic and non-syphilitic lesions,

**Treponema
Calligyrum.** and he says that "it can be distinguished from the *Treponema pallidum*, *Treponema microdentium*, *Treponema macrodentium*, *Treponema mucosum* and *Spirochæta refringens*, either by its morphology, cultural and biological properties, or all these conditions in combination."

**Spirochæta
Phagedenis.** Noguchi also reports the pure cultivation of a hitherto undescribed spiral organism found in phagedenic lesions in the human external genitalia, which he calls the *Spirochæta Phagedenis*, and says:

"Its etiological relation to the phagedenic lesions on the external genitalia has not yet been determined."

When an attempt is made to isolate the different spirilla which may be found in the oral cavity, the possibility of the *Spirochæta refringens*, *Spirochæta balanitidis*, *Treponema callipyrum* and *Spirochæta phagedenis* entering there accidentally is at least worthy of consideration. The *Bacillus coli* and the *Bacillus smegmatis* may be found in the mouth which implies that either direct or indirect contact with the excreta coming from the genito-urinary or intestinal tract has

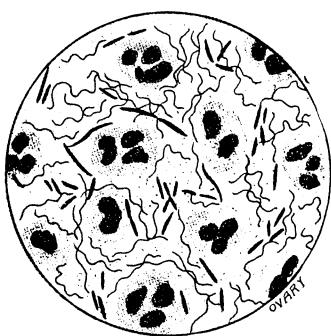


Fig. 46.

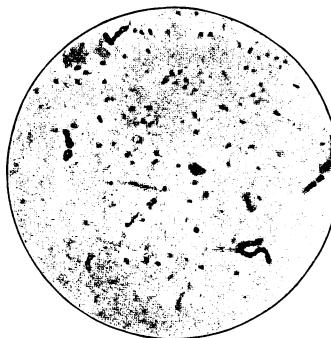


Fig. 47.

Fig. 46. *Spirochæta* of Vincent and the *Bacillus Fusiformis* and Leucocytes.

Fig. 47. The Minute Micro-organism of Epidemic Poliomyelitis (Noguchi and Flexner). An Agar Fragment showing Pairs of Globoid Bodies compared with Streptococcus Pyogenes. $\times 1000$.

taken place. Do our cooks, bakers, waiters, waitresses, delicatessen men, soda-water fountain men, bartenders, etc., always wash their hands before they handle our food and drink?

For the differential diagnosis of the *spirochætae* in the mouth and the diagnosis of erythematous, erosive or ulcerous lesions of the buccal cavity, the darkfield-microscope (dunkelfeld or ultra-microscope) is of great importance. Examined with this instrument, the living micro-organism appears white upon a black field. The method of Burri is also useful in detecting the *Treponema pallidum*.

A most important means of confirming the diagnosis of syphilis in the secondary and tertiary period, as well as of ascertaining the effect of treatment and detecting latent syphilis, is by the sero-reaction of Wassermann, Neisser and Bruck, which is based upon the work of Bordet and Gengou on the deflection of the complement. Another important method of diagnosing syphilis is by means of Noguchi's Luetin. He says:

"The luetin produces a cutaneous reaction in syphilitic and para-

syphilitic patients that is most constant and severe in the tertiary and hereditary affections. In my series of cases (400) it was present constantly (100 per cent.) in the manifest tertiary affection, in 94 per cent. of latent tertiary affection, and in 96 per cent. of the hereditary affection."

Sowade has applied the Abderhalden method to detect syphilis, and says he has obtained good results with it.

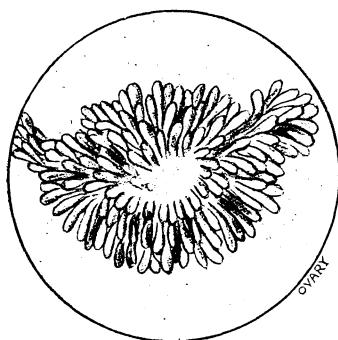


Fig. 48.

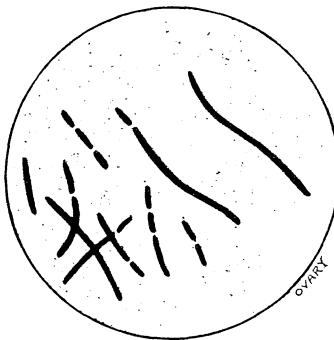


Fig. 49.

Fig. 48. *Actinomyces Bovis* in the Sputum of Man. (Modified from Kolle and Hetsch.)

Fig. 49. *Leptothrix Buccalis*. (Modified from Macé.) $\times 1200$.

The Minute Micro-Organism of Epidemic Poliomyelitis. Flexner asserts that the infection of Epidemic Poliomyelitis takes place through the naso-pharynx, that the virus ascends probably from the mucous membrane of the nose by the lymphatics to the pia-arachnoid membranes and adjacent nervous structures, multiplies there, and later attacks the medulla and the cord.

The filterable nature of the causal agent of this disease was discovered independently by Flexner and Lewis, and Landsteiner and Levaditi.

Flexner and Noguchi (1913) have discovered the micro-organism (Fig. 47) causing this disease, which consists of globoid bodies, 0.15 to 0.3 of a micron in diameter arranged in pairs, chains and masses, according to the conditions of growth and multiplication. They say: "Regarding the cultivated minute but visible micro-organism itself, it may be held on the basis of the data presented that it fulfills the conditions hitherto demanded for the establishment of causal relation between an extraneous parasite and a specific disease. The micro-organism exists in the infections and diseased organs; it is not, so far as is known, a



common saprophyte, nor associated with any other pathological condition; it is capable of reproducing, on inoculation, the experimental disease in monkeys, from which it can be recovered in pure culture." It, therefore, fulfills all the requirements of Koch's law.

The *Actinomyces Bovis* (Bollinger and Hartz)

Actinomyces Bovis. (Fig. 48) causes *Actinomycosis*, a disease in bovines characterized by the formation in the maxillary bones and tongue, of a hard sarcomatous-like tumor

tending to form pus. Since the discovery of this organism in the pus of empyema in man by Bollinger, many other cases of actinomycosis in man have been observed. In man, besides the maxillary tumor, local or general lesions resembling and at times mistaken for those caused by the tubercle bacillus are met with. *Actinomycosis* of the lung (bronchopneumonia or pleurisy) and peritoneum are also seen. The clinical diagnosis is often difficult, and microscopical examination of the pus and sputum should always be made. The *Actinomyces* is said to live in a saprophytic condition on grain, especially barley, and thus it is that the infection of bovines is explained. The infection enters the body of cattle by the mouth, pharynx or upper part of the alimentary canal, the micro-organism passing into the tissues through some break in the mucous membrane. It is suggested that man may be infected by chewing grain, etc., or inhaling particles of threshed grain. Wright maintains that the *Actinomyces* is normally present in the mouth, and that the irritation, etc., occasioned by the foreign body (grain, etc.) facilitates the entrance of the fungus in the tissues. There seems to be some ground for incriminating the tonsils (pharyngeal, faucial, lingual) and carious teeth, as ready points for the actinomycetic infection.

Suppurative lesions in the mouth and throat

Leptothrix Buccalis. have been attributed to a saprophytic micro-organism of the buccal cavity, the *Leptothrix Buccalis* (Fig. 49).

The *Oidium Albicans* (Fig. 50), the cause of

Oidium Albicans. Thrush or Parasitic Stomatitis, which is found almost constantly in the air, can grow in the buccal mucous membrane only when the saliva is altered through disease. This pathogenic yeast plant may invade the oesophagus, stomach, and at times the anus and vulvae. In exceptional cases it has passed into the blood and caused a general infection.

The *Saccharomyces Granulatus* has been found

Saccharomyces Granulatus. by Vullenin and Legrain in a tumor of the maxillary bone.

The *Cryptococcus Linguae Pilosae* has been described by Lucet in severe cases of Black Tongue. Lucet failed to reproduce the lingual lesions experimentally. Gugeon has found the Oöspora lingualis associated with the *Cryptococcus* of Lucet.

Sporotrichum. A number of observers (Schenk, Hektoen and Perkins, de Beurmann, Ramond and Matruchot) have described a disease principally characterized by

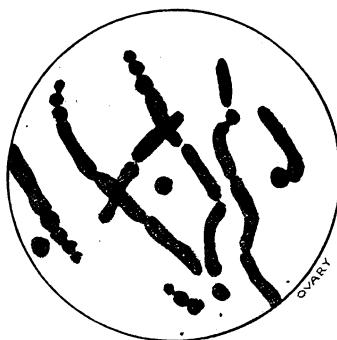


Fig. 50.

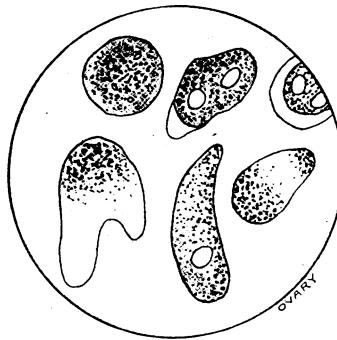


Fig. 51.

Fig. 50. *Oidium Albicans*. (Modified from Macé.) $\times 1000$.

Fig. 51. *Amoeba Coli*. $\alpha \times 400$. (Modified from Neveu-Lemaire.)

stubborn subcutaneous abscesses or disseminated multiple gummata, which soften and disappear in five or six weeks. The lesions are said to be caused by a fungus named by Smith the Sporotrichum, which may attack the mucous membrane of the mouth, pharynx or larynx. It may produce gummata in muscles of mammary glands, a papular or vesicular dermatitis, osteitis, synovitis or adenitis.

To-day the Protozoa plays a great rôle in both **Amoeba Buccalis**. human and veterinary pathology. Amoebae are frequently found in the human intestinal tract, and one species, *Amoeba hystolica*, causes in the tropic an endemic dysentery. Gross, Sternberg, Kartulis, von Prowazek, Dubar, Verdun and Flexner have proved the existence of an Amoeba variously called *Amoeba Buccalis*, *Amoeba Gingivalis*, *Amoeba Maxillaris*, *Entamoeba Buccalis* (von Prowazek) in ulcerations of the mouth and in tartar in carious teeth, in cancer of the mouth and in suppurations of the mandible. The pathogenesis of the *Amoeba Buccalis* is not known. It appears to resemble closely the *Amoeba coli* (Fig. 51), an inoffensive saprophytic micro-organism found in the upper part of the large intestine.



An Invisible Micro-organism—The Virus of Rabies.

Remlinger and Rifat-Bey and others have proved that the Virus of Rabies or Hydrophobia can easily pass through the following filters, viz., Berkfeld V and W N and Chamberland F. The virus is contained in the saliva of infected subjects, and Nocard and Roux state that it is always found in the saliva of the dog twenty-four to forty-eight hours before the animal shows any signs of rabies. According to Zagarrio, the saliva of a dog may be infectious two weeks before the appearance of any symptoms of rabies.

The central nervous system (especially the medulla) of those infected with rabies always contains the virus. Bites upon parts of the body having a rich nerve supply, such as hands and face, are particularly dangerous. The so-called Negri bodies are always found in the large nerve cells in the cortex cerebri, cortex cerebelli, hippocampus major, and are few or absent in the pons varolii and medulla. Negri and many other investigators believe the bodies discovered by him are protozoon parasites. Remlinger maintains that an invisible micro-organism attacks the nerve cells, and, as a result, the Negri bodies are formed within them. Celli and de Blaschi think that the Negri bodies are evolution forms of smaller micro-organisms, which can pass through the filters and cause the infection and, increasing in size, appear later as these Negri bodies. The Negri bodies, however, are specific to rabies.

Noguchi claims to have cultivated the parasite of rabies, and says that in the cultures very minute granular and somewhat coarser pleomorphic chromatoid bodies arise which on subsequent transplantation reappear in the new cultures through many generations.

The Causal Agent of Acute Articular Rheumatism.

That the Streptococcus is the causal agent of articular rheumatism has not been proved (Kolle and Hetsch), for, though it can enter the blood and cause articular and cardiac lesions, it cannot from this be inferred that it is a causal agent of articular rheumatism, because the Meningococcus, Pneumococcus and the Bacillus of Friedländer can also cause these lesions. The Streptococcus is not always found in the articular exudates; often they are sterile.

The curative action of an anti-streptococcus serum upon a case of articular rheumatism is not upon the rheumatism, but upon the Streptococcus infection, which took place through the tonsils and which is a secondary infection occurring in many diseases, more especially in scarlatina, diphtheria and variola.

Henry has obtained pure cultures of the Diplococcus of Popoff and Walker from the blood in eight cases of acute articular rheumatism. He also found in their blood a specific antibody for this Diplococcus.

Henry, Wassermann, Leyden, Payne and Paynter, Triboulet and Coryon believe this micro-organism to be the causal agent of acute articular rheumatism.

The protection of the organism from and the infection of the organism by pathogenic micro-organisms are not such simple things as they are sometimes represented to be.

Chapin says: "That a single germ will cause disease in a myth of the early days of bacteriology. Many germs are usually necessary, the number doubtless varying greatly with their virulence, with the species, with the nature of the disease process and with the mode of infection. . . . It is not the mere presence of germs, but their quantity that counts."

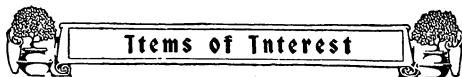
It is extremely difficult to single out those micro-organisms in the mouth which are saprophytic, or pathogenic, or which may become pathogenic.

Saprophytic micro-organisms in the mouth of a healthy person may become pathogenic when the mucous membrane of the mouth is injured, or the secretion of saliva is interfered with, or in the presence of a general systemic disturbance, or when associated with other micro-organisms, etc., and cause buccal lesions of a more or less serious character. Exposure to cold, in the absence of any apparent infection, may lead to a streptococcus angina; an erupting tooth in an infant may be accompanied by a stomatitis, in the exudate of which a great number of the fusiform bacilli of Vincent are to be found.

Man is constantly swallowing all kinds of micro-organisms. At birth his possible sterile buccal cavity is contaminated by the micro-organisms in the air and in the normal secretions or pathological exudates of his mother's vagina and in his mother's or cows' milk, and he himself continues this contamination later in life by such a simple act as placing his fingers in his mouth, etc.

To protect oneself from "bacillus carriers" is by no means easy. They are not only a menace to themselves, but to all who may come into direct or indirect contact with them.

The mucous membrane of the cheeks is not a favorable site for the growth and development of micro-organisms, as they are being continually swept away by the saliva, but micro-organisms may develop in great numbers on the surface of the tongue between the papillae, at the gingivo-dental margins, between or upon the surfaces of the teeth, in the crypts of the lingual and faucial tonsils, and in the ducts of glands; micro-organisms have been found in Stenson's duct, but not in the parotid gland. Great numbers of micro-organisms are always found in the tartar on teeth.



During sleep the defensive powers of the mouth are lowered, and the growth and development of micro-organisms are facilitated in the buccal cavity. On awakening the tongue may be dirty, coated, covered with epithelial débris, the breath is often disagreeable or fetid, and the contents of the mouth are often acid in reaction. In febrile diseases, when the salivary secretions are diminished, the breath becomes offensive, the contents of the mouth acid, and thus are favored the development of micro-organisms and the production of buccal lesions.

In the mouth the protective influences against pathogenic micro-organisms are provided by (1) the stratified squamous epithelium, which acts as a living coat of mail, of which the upper squamous cells are continually being desquamated and replaced by the younger cells beneath; the desquamated cells thus carrying away the micro-organisms which lie upon them; (2) the mechanical action of the saliva in washing out the mouth, especially during the movements of the tongue; (3) the phagocytic action of the leucocytes which wander between the stratified squamous epithelial cells, and which are found also upon the free surface of the buccal mucous membrane; (4) possibly the action of defensive ferments in the saliva which have a destructive action upon "the protein poison."

Vaughan and Wheeler (1903) have shown that the *Bacillus coli communis* and other pathogenic and non-pathogenic micro-organisms and animal and vegetable proteins contain a highly active poison—"protein poison." Micro-organisms are particulate proteins. No cell fails to give a protein reaction.

Abderhalden and his pupils have proved the formation and specificity of the defensive ferments in the animal organism, and Abderhalden says: "The fact that the animal organism replies to the invasion of disharmonious substances by means of specifically directed ferments, is of the greatest importance to physiology as well as to pathology."

Many facts accord with the suggestion that the leucocytes play a part in the production of defensive ferments, and Abderhalden says: "They (leucocytes) probably give off these ferments to the circulation. If so, we should then have in the blood plasma phenomena more or less analogous to those observed, for instance, by B. Friedrich Müller, during the dissolution of the fibrin that is excreted into the alveoli in cases of pneumonia. We see here numerous leucocytes penetrating into the solid exudate and dissolving it, after which an absorption of the products of decomposition begins, a kind of digestion taking place in the interior of the alveoli. Here, also, as can be shown by special experiments, ferments can be demonstrated in the contents of the alveoli (in the expectorated sputum); and these ferments take their origin from the



leucocytes. The old view, whereby the leucocytes take up substances from the outside and digest them, must now be completed by the observation, that ferments can be given off to the exterior, and that therefore digestion may be accomplished outside the cell."

The morphological unit of an organism is the cell, the physiological unit is the protein molecule in the cell. Disease may occur without the presence of any micro-organism, because proteins which gain access to the blood, lymph and cells of the body and sensitize the cells, cause disease. Disease can be caused by the parenteral digestion of proteins. A foreign protein (particulate, in solution, alive or dead) getting into the blood or lymph of the body must be disposed of by parenteral digestion.

Hay fever is due to sensitization to the pollen of different plants. When peptone or finely divided proteins are inhaled inflammations of the upper air passages may result. Absorption from the alimentary tract of undigested or partly digested proteins may cause sensitization. Every living cell has not only extra-cellular ferments, which prepare the food for absorption by the cell, but probably also intra-cellular ferments which are engaged in the anabolism of the cell.

The pathogenicity of a micro-organism depends not only upon its capability of digesting and feeding upon the proteins in the cells of the host's body, and thus enabling it to grow and reproduce, but also upon the fact that the ferments of the cells of the host's body must not be immediately destructive to the invading micro-organism.

A pathogenic micro-organism grows and reproduces itself in its host's body by producing extra-cellular ferments which, acting upon the proteins of the host's cells, prepare them for absorption by the invading micro-organism and these absorbed proteins are built up into the protoplasm of the invading micro-organism by its intra-cellular ferments. During the incubation period of a disease, there are no symptoms, although the invading micro-organism is actively growing and reproducing itself in great numbers at the expense of its host's proteins. At this time the micro-organism produces the ferment, the proteins of the host are the substrate, the process is constructive, so far as the invading micro-organism is concerned, and no protein poison is liberated.

At the expiration of the period of incubation of the disease the symptoms appear. The cells of the host have become sensitized to the foreign protein and form a specific ferment in order to digest the protein of the pathogenic micro-organism.

The invading micro-organism is now the substrate for the ferment of the host's cells and the process is destructive to the invading micro-organism; it then liberates the protein poison and the symptoms of the disease are manifested.

Vaughan states: "Of all the bacteria with which we have worked the Bacillus prodigiosus yields the largest amount of the protein poison, but this organism is not pathogenic to man or laboratory animals because it cannot grow and multiply in the animal body. On the other hand, the anthrax bacillus yields a relatively small amount of the protein poison, and yet it is one of the most infectious organisms because it can grow and multiply in the animal body."

Abderhalden asks the question: "May it not be that immunity partly rests upon the fact that an organism is able to set free its defensive fermenta quicker than usual?"

Disease may be transmitted to some extent by dust and mouth spray, but to a much greater extent by direct and indirect contact. All persons are not clean.

The greatest prophylaxis must be through personal cleanliness.

"It is usually comparatively simple," Chapin says, "so to live as not to allow the secretions of others to come in contact with one's own mucous surfaces, and it is easy, and should be considered immoral, to allow one's own secretions to be so placed that they may infect another."

The immorality of so endangering another's health was perhaps in Carlyle's mind when he said: "Regard health as the real equilibrium and center of things. You should always look at the *heilig*, which means *holy* as well as *healthy*." Such a universal regard for health will go far toward what Bacon called "the establishing of the kingdom of man."

I am indebted to Dr. Francis O'vary for the drawings of the cuts with the exception of Figs. 44 and 48.

Dentistry in Brazil.

By W. J. FROST, D.D.S., Emmetsburg, Iowa

A recent report by one of the New York papers that dental clinics have been established in every public school building in Rio de Janeiro challenges the attention of thoughtful dentists everywhere. The announcement is all the more startling because it emanates from a land where dentistry in general is so crude that its practitioners barely enjoy the dignity of a profession, and the degree of Doctor of Dental Surgery has never been conferred.

Yet Brazil is a great country. Geographically it is by far the



largest of South America, and it is equal in size to the United States with Texas measured twice. Only last October the Pan-American Dental Congress was held in Rio with the president of the Republic as patron. It was an event worth traversing oceans to attend, for Rio is one of the most beautiful cities in the world. Stately Royal palms, planted by Emperor Dom Pedro I. over a century ago, adorn the *Jardim Botanico*, reaching skyward like tropical giants; and the magnificent bay harbors the mighty ships of every flag that floats.

Washington Irving, in his delightful sketches of rural life in England, reminds us that the stranger who would form a correct opinion of the English character, must not confine his observations to the metropolis. The same general principle applies when a foreigner ventures to describe conditions in Brazil. "He must go forth into the country, he must sojourn in villages and hamlets; he must visit castles, villas, farm-houses, cottages; he must wander through parks and gardens; along hedges and green lanes; he must loiter about country churches; attend wakes and fairs, and other rural festivals; and cope with the people in all their conditions, and all their habits and manners."

So it was my privilege to see Brazil and the Brazilians. Fortified with a signed contract by the Secretary of the Interior I proceeded to my destination at the terminus of the Brazilian Central Railway, some fourteen hours inland from Rio. Not far from here was Ouro Preto, the birthplace of Tiradentes the first martyr for Brazilian independence.

Tiradentes, as the name would imply, was a dentist—literally *tooth-puller*. He was a lieutenant of militia when apprehended on a charge of treason. With some fellow conspirators he was found guilty, drawn and quartered, and his head placed over the gate of his native city, a fearful and ghastly warning to conspirators against the Empire for all time.

Tiradentes has been dead more than a hundred years, yet dentistry in Ouro Preto has made but little progress to this day. Dental offices are unknown, and the unfortunate victim of *dor de dente* must either patronize the local barber or endure his affliction in silence.

Nor is dentistry among the natives in other parts of Brazil outside of the large cities in any more flourishing condition. At the American college in Juiz de Fora, with which I was for a time connected, the dental students are obliged to patronize the local barber to obtain teeth for prosthetic purposes. And while much emphasis is placed on the theoretical branches, the dental course is far inferior to the curriculum prescribed in the United States. The course covers but two years and the seniors or second-year students spend but two hours a day in the infirmary. A live American student could easily do the work of four



Items of Interest

natives; and the first year's laboratory course requires the taking of an impression, making a base plate, one Davis crown, and one shell crown. Out of eight teachers on the staff but two are dentists.

Fees. As might be expected in a country where the standard is so low, the American dentists practicing in Brazil are immensely popular. They are to be

found only in the large cities, and demand fees which in this country would be considered fabulous. For instance, I am personally acquainted with a dentist in the capital who receives for his services fifty mil reis (about seventeen dollars gold) per hour, in advance. An unlicensed American dentist in his employ gets thirty mil reis an hour. Even estimating living expenses at twenty per cent. more than they are in the States, it may readily be computed that our *Dentista Americano* has a veritable bonanza.

License Requirements. The mention of generous fees and abundant practice naturally leads to a consideration of the qualifications for practice. Strictly speaking, there

is no such thing as a State board in South America.

Instead, the candidate for license to practice in Brazil must defend a thesis, written in the Portuguese language. If successful, he is entitled to practice in any of the twenty-one States. Outside of the fact that a comprehensive knowledge of the language is an essential requisite, the examination is nothing to fear. No operative procedure of any nature is required.

Should any of my brother dentists in this country be enticed, however, to locate beyond the Equator, I would earnestly advise him to weigh seriously the advantages and the disadvantages. In a general way the American dentist practicing in another country enjoys the distinction of being in a class by himself. And this is especially true of American dentists in Brazil. The men who have gone before have been, with hardly an exception, "workmen that needeth not to be ashamed." Electricity is abundant and cheap; for Brazil is rich in natural water-power. There are no coal bills to pay, and the hiss of the steam-pipe is never heard. Summer, like its rivers, goes on forever.

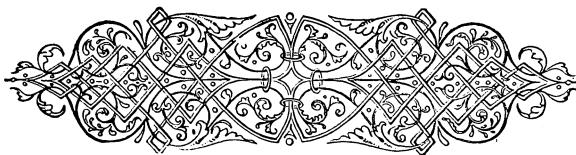
Customs of Brazilians. Among the disadvantages might be mentioned a few of the disparaging features that cause the energetic foreigner to curse the day he set foot on Brazilian soil. The natives are exceedingly procrastinating,

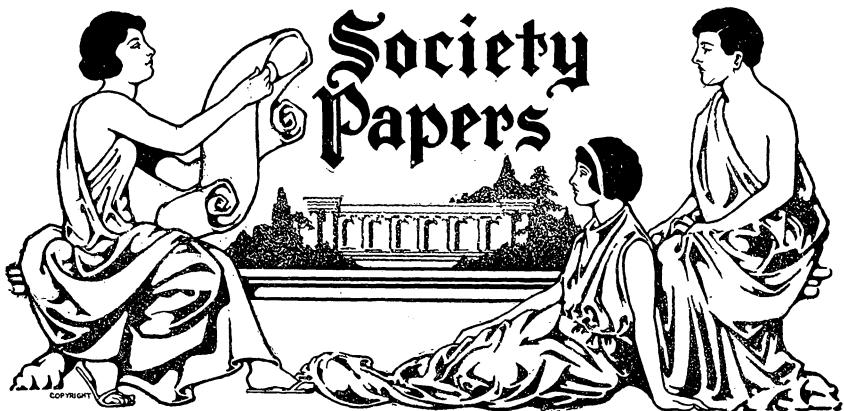
and it is next to impossible to get anything done in a hurry. A very popular phrase is "*Amanha, si Deus quizer*"—To-morrow, if God wills. It is exasperating to hear people talk and laugh when you do not know what they are talking about and you cannot see the joke. Yet unless



you have a pretty general smattering of Spanish it will be months before you can do either. There are strange customs and queer habits, at utter variance with anything you ever knew before. Then there is the consciousness of being expatriated in a foreign land beneath strange stars. If these inconveniences can in a measure be overcome, then Brazil offers opportunities to the American dentist that are second to none. Let no one, however, presume to revolutionize existing conditions. Time and again, as I observed conditions beneath the Southern Cross I thought of what Kipling put into verse about India, but which is equally appropriate to South America:

"Now it is good for the Christian's health
To hustle the Aryan brown;
For the Christian riles
And the Aryan smiles,
 And he weareth the Christian down.
And the end of the fight
Is a tombstone white
 With the name of the late deceased,
And the epitaph drear,
"A fool lies here
 Who tried to hustle the East."





Amalgam and Its Phases.

By W. G. CRANDALL, D.D.S., Spencer, Iowa.
Read before the Union Meeting of the Third and Fourth District Dental Societies, at Schenectady, N. Y., October, 1913.

(Continued from July issue of ITEMS OF INTEREST.

Failure from the Use of Unbalanced Alloys. The term "Balanced alloy" signifies an alloy which when amalgamated will not show shrinkage or expansion. That is, the movement in one element or group of elements is exactly overcome by an opposite movement in another element or group of elements. To understand these conditions we must make a study of the metals commonly used in alloys, and the process of alloying.

The metals that have been used to any extent in dental alloys are silver, tin, copper, zinc, and gold. Many others have been tried but are not used to any extent.

Silver. Silver is the element of strength in all alloys. It increases in volume when amalgamated. It increases strength and lessens flow, and because of its affinity for mercury when properly exposed, it hastens setting. It tarnishes in sulphureted hydrogen and soluble sulphides. It causes the mass to work hard.

Tin. Tin unites with mercury in all proportions forming a weak crystaline compound. It retards setting, decreases in volume when amalgamated, decreases edge strength, increases flow and produces an easily worked mass.



Copper. Copper unites with mercury with great difficulty at ordinary temperatures, it increases the strength when used in not to exceed five per cent., decreases flow, does not contract nor expand, and is easily tarnished.

Zinc. Zinc used in sufficient quantity it is claimed will aid amalgamation. Dr. Black, after years of careful observation of the effect of various modifying metals, says: "Experiments in watching fillings for five years show also that one-half per cent. of zinc is inadmissible, for the reason that the amalgam will continue to change bulk very slowly for that time and perhaps much longer. Though this change is not large (not more than one to one and one-half points per year with one per cent. of zinc), it will finally destroy the usefulness of the filling. This effect was so subtle that it was not at first discovered."

Gold. Gold adds no desirable properties in any proportion. It causes amalgam to be springy and difficult to pack.

There are in common use to-day two distinct classes of alloys. First, a low per cent. silver alloy which has easy working qualities, amalgamates easily, packs easily, has good color, shrinks and flows badly, and sets very slowly. These alloys are made because there is a demand for them. They are used because there is no *difficulty* in using them, and they have a very good appearance for a time. These alloys contain from 43 to 60 per cent. silver, 40 to 58 per cent. tin, and 1 to 5 per cent. zinc.

The second class is known as "Black alloys," "high per cent. silver alloys," or "quick setting alloys," the three names being synonymous. They contain from 65 to 75 per cent. silver, tin and sometimes copper and zinc. They are quick setting, work rather hard, require more mercury, and are supposed to be tested so as not to shrink but to expand very slightly, and flow but very little under ordinary conditions. The basic idea in what are known as Black alloys is that metals are dissolved in each other in such proportions, that movement in one will exactly counterbalance movement in the other.

Methods of Manufacture. The value of the amalgam alloys depends very largely on the manufacturing process. This would include the manner and method of melting the metals, temperature at which they are melted, time they are kept molten, the thoroughness of the solution, the temperature at which they are cast, and the rapidity of cooling. The electric furnace is used for this purpose and is devised with a thermostat and accurately controlling



reostats. This is kept surrounded by hydrogen gas, and the lower fusing metal is first brought to solution. The higher fusing metals will dissolve quite readily in the lower fusing metals with a very slight increase in the fusing point. Great care and skill are required in this process to produce a perfect solution. There are frequently formed in alloys that have been overheated, what are known as eutecticons. In these eutecticons two or more metals have formed a mass differing in percentage to the metals as originally intended for the alloy. This may be observed by melting an alloy ingot, when the difference in the fusing point of the different alloys may be observed. If there are no eutecticons, the entire mass will melt at one degree of heat. If eutecticons are present, the lower fusing alloy will become fluid at a certain temperature, and particles of a higher fusing alloy will be observed afloat in the solution.

A similar occurrence may be observed in the freezing process of salt water, although the salt may be in perfect solution in the water, the first ice formed will be observed to contain a smaller proportion of salt than will be found in the water.

It is essential that alloys should be formed in as perfect solution as possible. Where the solution is not perfect and contains such eutecticons as I have described, the working qualities of the alloy must vary in proportion to the variation of the metals in the separate alloys found. If a portion of the alloy used in a certain filling chanced to contain a large proportion of silver, it would be found to produce a filling difficult to amalgamate, would expand badly, and require a large amount of mercury. Or, if another contained an excess proportion of tin, it would amalgamate very easily, take up less mercury, and would shrink and flow badly. Such uneven solutions are not permissible in our endeavor to obtain a perfectly balanced alloy. After the pouring and cooling of the alloy, the filing should be done very slowly, so as not to produce heat and cause an uneven tempering of the alloy.

**Tempering
or Ageing
of Amalgam.**

It has long been known that alloys undergo a change after being fully prepared for use. This change is known as tempering, or ageing. It is not an oxidation nor a chemical process in any respect, but purely a physical phenomena and one which I will not attempt to explain. It might be illustrated as similar to that of the barber's razor, which at times gets out of sorts, and the barber says, "it needs a rest." This sounds, indeed, very odd to us, but the rest seems to produce the desired result. Ageing is in some way an adjustment of molecular form, which has been mal-adjusted by the heating and cooling process.



Ageing is essential in an alloy for three reasons. First, an alloy that would be properly balanced the day it were made and with which a perfectly balanced filling might be made that day, would age so rapidly, unless kept in a very cold place, that fillings made with it a few days later would shrink. Second, they are so quick setting that it is almost impossible to manipulate them. Third, it requires too large a proportion of mercury to bring about a good amalgamation.

Ageing may be brought about by permitting an alloy to stand in the ordinary room temperature for several months, or by the application of a low degree of heat for several hours, or by being heated to the boiling point of water for about fifteen minutes. The ageing by time at ordinary temperature is too indefinite and slow to be considered. The application of a definite degree of heat for a definite time gives us better control of the alloy.

The ageing process is a softening process. It will cause an expanding alloy to expand less, a shrinking alloy to shrink more. It tends to reduce the strength and to increase the flow. It makes easier the amalgamating process.

An alloy that has been properly annealed will continue to anneal at ordinary room temperature. The effect of this continued ageing does not cause the alloy to shrink more. Such an alloy will require less mercury for amalgamation, will work easier, and authorities seem to agree, that it causes continued loss of strength and a continued increase in flow. It will also set much slower.

Because of the effect of continued annealing, an alloy becomes quite unfit for use one year after its manufacture. And because of this, dentists should have some means of knowing the age of the alloy they are buying. They should not purchase in quantities larger than they can use within a year.

The stage of annealing in which no further shrinkage appears, Dr. Black has termed the zero point of annealing. A balanced alloy annealed to this point is rather quick setting; if continued past this point, setting is slower. Therefore, any first-class alloy must be rather quick setting.

The fineness of the cut of alloy has its effect on the setting qualities of an alloy. Because of the additional surface exposed the smaller the filing the more surface of alloy will be exposed to the action of the mercury, giving opportunity for greater mercury absorption and causing quicker setting.

To produce a balanced alloy with commercial silver and tin is a very delicate process, requiring many tests and accurate measurements with the micrometer. The point at which this balance is found varies

from 72 to 75 per cent. of silver. If it were possible to use chemically pure silver and tin, a definite formula could be established but different lots of commercial silver and tin vary in their properties, so that it is necessary to form a balance with every lot of metals used.

A variation of one-fourth per cent. might produce a shrinkage sufficient to destroy the value of the fillings. If the balance point is missed $1/25000$ of an inch and this amount of shrinkage would take place about the margin of the filling, the value of our alloy may be seriously doubted. There is no other way known of obtaining a balance except that devised by Dr. Black, which requires very close measuring, together with the most accurate technique in making. Therefore, we may conclude that the alloy manufacturer, no matter how skilful he may be, cannot make a perfect alloy without the aid of accurate instruments with which he can detect and control the movements in an amalgam while setting.

Dr. McCauley says: "The practice of following a set formula for manufacturing an alloy is pernicious and should not be tolerated by the dental profession."

**Evil Results
of Shrinkage of
Amalgam.**

The effect of shrinkage of amalgam fillings is discoloration and recurrence of decay. Shrinkage of one point as shown by the micrometer measurement may produce a ditch between the filling and cavity wall as wide as a ten-thousandth of an inch.

The micro-organism which produces caries measures from four-tenths to eight-tenths of a micron. The micron is a thousandth of a millimeter, or $1/25000$ of an inch. The micro-organism measures from $1/65000$ to $1/32500$ of an inch and a few figures will reveal the fact that one point of shrinkage will open up a passage sufficient to admit three to six of these little offenders side by side. Even less than one point of shrinkage will admit micro-organisms and decay may begin again where the cavity margins cross a susceptible line. Now the question arises, "what should be done with the vast number of commercial amalgams which shrink from one to fifteen, and even twenty points?"

**Amalgam
Micrometer.** I have had built a micrometer more simple in construction than that built by Dr. Black, and, I believe, many times more accurate. In this micrometer there are but few movable parts and only one of these could possibly be inaccurate. The unit of measurement which I use is the micron ($1/25000$ inch). It would be possible with this instrument to make the unit of measurement as fine as $1/100000$ inch, and we may some time care for that kind of a reading. The first amalgam



micrometer was built by Dr. Hitchcock, of New York, and the unit of measurement was $1/1000$ inch. Very unfortunately for the profession Dr. Hitchcock died before his work was completed. Dr. Black constructed his micrometer along much the same lines, but found the measurements should be more delicate; he established the unit of measurement at $1/10000$ inch, and speaks of this as one point. My experiments convinced me that most micrometers of the Black type were not sufficiently accurate, or, the reading was not as fine as it should be. The Black micrometer is built on the rack and pinion principle and is moved by a fine chain; there are so many moving parts that for very delicate reading there is too much lost motion. The instrument has been of inestimable value to us. Greater accuracy is an advantage in that we can detect the more minute movements of the amalgam, and be more certain of a balance. In fact, after working with this instrument, I became convinced that many alloys that had seemed to show a balance by careful tests were unfit for use.

When Dr. Black made an examination of the dental alloys in use in 1894, he found that they all showed shrinkage. The manufacturers were not to blame, for they were ignorant of the value of their materials. In 1912 Dr. McCauley reported a number of tests before the N. D. A. He does not regard his tests as conclusive, especially as he was unable to get samples of all the alloys used in this country, and there were not sufficient tests made of each alloy. Out of the large number which he did test, he was compelled to eliminate as unsafe to use all but five, and these five were subjects for further examination. The results of Dr. McCauley's tests show a large percentage of alloys to have excessive expansion. Many had both excessive shrinkage and expansion. All this. Seventeen years after Dr. Black had published his findings on the manufacture and testing of alloys, shows a lamentable state of carelessness, both upon the part of the manufacturer and the profession. And, of the two, I believe the profession is more to blame. When we demand accurately made alloys, we will get them, but as long as a majority of the profession prefer and use the velvety, easy working alloys, it is too much to expect the manufacturer to go to the trouble and expense of changing his methods. We all like too well the easy way.

Speaking accurately, there are no alloys which are perfectly balanced, at least, I have never been able to find one. The best we can hope for at present is an alloy which when well amalgamated, and after having the setting changes take place, will show a slight expansion. Fifteen microns expansion is none too great. Any alloy which will show only a minimum expansion will first have some shrinkage.



**Methods
of Testing
Amalgam.**

It might be of some interest to you to know how these tests are made. It is first determined what proportion of mercury is necessary to make a good amalgamation. The larger the amount of alloy used, the larger the ratio of mercury must be, because of the fact that we cannot have the advantage of thorough grinding and manipulation with the larger masses. It usually requires about sixty grains of alloy for the micrometer tests. The amalgam is manipulated as nearly as possible the same as we would have it if packed in a cavity. The cavities we use are the well-known Wedelstaedt tubes. The cavity is cylindrical in form eight by eight millimeters, cut in a steel cylinder, one inch in diameter by one-half inch in depth. The strength of this tube is such that it will resist the strong expansive force of any amalgam, causing it to protrude from the cavity. As soon as the amalgam is packed into the cavity, we use a straight edge knife and plane off the excess. The object of this is to make all fillings as near the same size as possible. We then place a smooth metallic touch point at the center of surface of the filling, using a fine short tack for this purpose. The tube is then immediately placed in the micrometer. The arrangement is such that it will only go in in one position, and the measurement takes place at one exact point. The measurement of the filling is made as soon as is possible. I have seen published reports of these tests when the first reading was not made until the filling had been made fifteen minutes. This would be a good method with which to bolster up the reputation of a shrinking alloy. The object of testing the amalgam is to know just what movement takes place and as shrinkage always takes place first and very quickly, we should record every movement the same as it would occur in a filling in a human tooth.

A record is made of the number of the tube, the kind and condition of the alloy, the number of grains of alloy and mercury, how they amalgamate, amount of excess mercury, if any, the setting qualities, and any other data that is of interest to the test. The day, hour, and minute of each reading is recorded opposite the reading. Readings are made every minute as long as movement occurs. The best balanced alloy will usually show a shrinkage of from three to five microns during the first five or ten minutes, and then expansion will begin and should overcome any shrinkage within thirty minutes, often in much less time. I should regard as dangerous any amalgam that shows a shrinkage in excess of eight microns, or expansion above thirty microns. There is some question as to this small primary shrinkage being true shrinkage. It is not discernable at the margins under the microscope. I cannot prove it, but feel quite certain that this very slight movement is a surface absorption of

mercury and possibly a dropping of the center of the surface and rounding of the angles, that we observe in the congealing of any metal. My observations led me to believe that this dual movement is closely related to incomplete alloying, as it diminishes perceptably in those alloys which are carefully made. In considering these movements, you must keep in mind that these figures represent a very small and accurate movement, in fact, so small that they have never to my knowledge before been recorded or reported. Also that ten microns shrinkage represents a great deal more movement than would ten microns expansion. On account of the way these tubes are constructed, expansion must occur only in one direction, and we measure it all in that direction, while shrinkage is from all surfaces toward the center of the filling, and we can record it only upon one surface. I know of no scheme whereby a micrometer can accurately record shrinkage in the same ratio as it records expansion, neither do I know of any reason why it should. Any amount of shrinkage is so dangerous, that the minutest suggestion of it should warn us of its dangers, that we may flee from them. It may occur to you as strange, why the best balanced alloys should first shrink and then expand. I would remind you that alloys are solutions of principally tin and silver.

Tin amalgamates readily and always shrinks. Silver amalgamates slowly and expands, therefore, the mercury takes up the tin first, causing shrinkage, but later the silver, with its slow and determined affinity for mercury, becomes better amalgamated, possibly taking away from the tin some of the mercury it had absorbed. And if the silver is in proper proportion in the alloy, it will show an expansion. In manufacturing balanced alloys, sample alloys are made from the lot of metals to be used. If more expansion is desired, silver is added. If expansion is too great, the tin ratio is increased. In this means, a satisfactory balance is worked out for the metals to be used and for the metals tested only. Using chemically pure metals a fixed formula could be used, but the price for chemically pure metals is prohibitive for alloy making. Commercial silver and tin of very great fineness is to be had, but it is necessary to work up a balance with each change of metals. If the alloy manufacturer is very particular about his product, he should make frequent tests of the alloy as it is being manufactured, for even with the greatest care, a change in the behavior of the alloy may take place.

The best of alloys will not produce good results without intelligent manipulation. I realize that I am about to contradict a most eminent authority when I make this statement, but I am thoroughly convinced from repeated experiments, that the amount of excess mercury does have a very decided action on contraction and expansion. From a scientific point of view it is only reasonable that if mercury will cause tin

amalgam to shrink, and silver amalgam to expand, an excess of mercury must produce more and longer continued movement than a minimum amount of mercury, and this is just what it does. A shrinking amalgam will shrink more with an excess of mercury, than when worked very dry. An expanding amalgam will show greater expansion with a large excess of mercury than when worked dry. A balanced alloy will show greater primary shrinkage and greater expansion with an excess of mercury.

Fillings made from well balanced and correctly annealed alloys should maintain perfect margins. If it maintains perfect margins, it has no superior as a tooth-saving material. It is possible to make perfect amalgam fillings, and is not particularly difficult. It does require a careful technique, but nothing that any dentist cannot master. The day is fast approaching when our patients will not countenance poorly shaped, ill-finished fillings with a black ditch about the entire margin, and the best thing that can happen to the dental profession is such an education of the public. Another advantage in the use of balanced alloys is that there is no discoloration of the dentine from such amalgam. Just so long as air and moisture are excluded from the tooth, there can be no change in color, for it is only by contact with the compounds of sulphur that the discoloration can take place.

With the desire to know something more of the
Tests of action and appearance of leaking fillings, I have
Leaking Fillings. made an air-pressure appliance somewhat similar to
that suggested by Dr. Southwell, of Milwaukee.

This appliance is very simple, consisting of a pressure tank with pump and gauge. The air is conducted from the tank to four taps onto which the steel cavities with test fillings are screwed and immersed in water for the test. The cavities are made in steel and I have two forms: one is a simple round cavity, the other is made to represent a proximo-occlusal cavity similar to what we might find in molars. The walls are exactly parallel, and there is no bevel to the margin. They are so made that some part of the seat of the cavity consists of the flat end of a screw, that is to be removed when the filling is completed, so that the cavity may be placed upon the testing appliance for the pressure test.

To make the tests, the fillings should be placed in a glass dish of very clear water, so that they may be seen from all sides. The air pumping should be begun very slowly, that the margins of all the fillings may be carefully watched for bubbles of air that may begin to leak at a very low pressure. Indeed, it is surprising how little pressure is required to cause air to pass about the great majority of fillings. Of 110 fillings made and tested by this appliance, 42 resisted to exceed two

pounds pressure without leaking air about the margins. All the balance leaked at from a few ounces to two pounds. A very few fillings failed to leak at the maximum pressure of 45 pounds. A large number leaked at so low a pressure that the gauge would not register. Twenty-six different operators took part in these tests and it is quite unnecessary to say, that they all did their best. There were twenty-three different alloys used, and I have used every effort to test out those that were the best known and most popular. I feel safe in saying that of this number of alloys not to exceed three are well enough balanced to make a perfectly and permanently tight filling. If a few ounces pressure will cause a violent leakage of air about the margins of a filling, we have no reason to believe that such a filling in human teeth would resist the ingress of moisture and bacteria under such air pressure as might be exerted in the human mouth, or under the pressure in the act of chewing certain hard and sticky foods.

No doubt we all have had our attention called to these conditions, when our patients have complained to us, that certain teeth which have recently been filled with amalgam, caused pain when in the act of eating sweet food. We have dismissed such patients with different excuses, but with the thought in our minds that the trouble was all an unbalanced condition of the patient's mentality, when, in fact, the trouble was all caused by the unbalanced condition of the alloy filling. This state of affairs is, indeed, a calamitous one and the attention of the profession should be given to its immediate correction.

This air-pressure test I believe to be practical as a test for good adaptation, and as a possible proof of the accurate balance of the alloy used. It would be of very little use in producing a balanced alloy.

The further dangers of a shrinking filling are shown in the causes of discoloration. Dr. Adolph Witzel has demonstrated in his work that it is quite impossible for a tooth to discolor from a filling that

**Discoloration
of Amalgam.** does not leak. A filling which will exclude moisture and sulphureted hydrogen, which is so frequently found in the mouth, has no means of discoloration. Therefore, the only opportunity for discoloration must come from the leaking of the amalgam. The discoloration of the tooth substance is something separate and apart from the discoloration of the exposed part of the amalgam filling, the filling we expect to discolor. We know from experience that it is possible to have shrinkage, leakage, and discoloration without having a recurrence of decay. The effect of the oxides and sulphides seem to have a preserving effect upon the tooth tissue, and unless the margins fall within an area of susceptibility, there may not be decay in years.



The discoloration of the amalgams *per se* vary with the compositions of the alloy. Those alloys that contain copper in considerable proportions are usually acted upon by the sulfids, and a deep black is the result; other colors, such as green and blue-green are occasionally produced. Those alloys in most thorough solution will maintain the best color when amalgamated. Because of the danger of these discolorations, amalgams cannot become suitable for fillings in the anterior portions of the mouth.

Strength of Amalgam. The strength of amalgam is next in importance to that of shrinkage, and has its dependence upon many factors. Curiously enough, the greatest

strength and freedom from flow of a silver-tin alloy is found at or very near the point of balance. This almost seems to have been divined for our advantage. We find that the greater proportion of silver under 75 per cent. will produce the stronger amalgam. When the proportion exceeds this, a loss of strength and toughness is observed, and the filling becomes more brittle. I have been able to make a filling of cylindrical form five by five millimeters, which when only one day old withstood a pressure exceeding one ton, and under 400 pounds pressure for three and one-half hours showed a flow of but two per cent. It is but reasonable to expect that such a filling would have great edge strength, although the toughness of gold is not expected. Such strength is far in excess of that of human dentine.

If five per cent. of copper be added to the alloy, displacing that amount of silver, the strength of the alloy will be increased about twenty per cent.

The strength will be greatly influenced by the method of mixing and packing. The strongest amalgam will be produced by a thorough grinding and mixing with the proper amount of mercury. Either too little or too much mercury will decrease the strength, also a failure of sufficient kneading will cause a loss of strength. Strength depends very largely upon the actual union of the mercury with the alloy. If the union is not sufficient, the amalgam will be brittle, if there is a surplus of mercury, the mass will be soft and lack strength. Strength is also modified by the age or ageing process of the alloy, an over-aged alloy is weak. Dr. Black has demonstrated that alloys continue to lose their strength standing at ordinary room temperature for over twelve years. Old alloys are not fit for use.

Effects of Flow of Amalgam. When we speak of flow of amalgam, we mean the gradual movement under pressure, either sustained or intermittent. I consider the flow of amalgam a greater danger than poor strength.



The overhanging margins of amalgam that you no doubt remember having seen very often, are not generally the results of expansion, but are either flow or an unfinished filling. When a filling flows from a cavity, it is not a process of increasing bulk, but of changing form, and consequently, there must be leakage at some portion of the cavity surface.

Dr. Black says: "An amalgam made of an alloy of tin and silver will have this property of flow in proportion to the tin it contains. If we subject pure silver, say a block one-tenth inch square to three hundred pounds, it will yield a very little almost immediately the pressure is applied, then it will yield no more until the weight is increased. If we try a similar block of tin in the same way, we find it softer. It will yield sharply at twenty-five pounds, and if we leave it under this pressure without increasing it, it will continue to yield until it has all crawled out between the points, or has been reduced to a thin sheet. Any amalgam that will flow under a pressure of fifty pounds, becomes unfit for filling teeth on account of this flow. Every stress of that degree would move it a little and it would soon be destroyed."

Some alloys of a distinctly granular character resist flow better than those of a smoother nature. "The difference in the rate of flow between different metals depends upon their plasticity, by virtue of which they yield to the pressure and allow the molecules to slip over each other and assume new positions." To make amalgam of great strength we should follow the example of the builders of great structures. I think amalgam should partake of the nature of concrete. When the builder wishes to get the greatest strength from concrete, he uses crushed rock or sharp sand, as his unit of strength.

He uses just enough cement to fill the space between his units of strength, and just sufficient water to fill the minute spaces that still exist between small particles of cement. This produces one of the most resistant masses known to science. In a way our amalgam structure is of the same nature. Mercury dissolves out sufficient tin and silver from our granules to fill in the spaces and form a solid mass. The strength of the mass depends upon the accuracy of the manipulation and the qualities of those granules.

Strength. Strength can also be increased up to a certain point by thorough condensation. Just recently I made up a number of fillings to test the effect of heavy condensation. Fillings for these tests are made in steel cavities which form 85/1000 inch cube. I used seven parts alloy and eight parts mercury; this was thoroughly ground in the mortar and mixed in the palm and the excess mercury squeezed out through chamois. The amalgam was packed in the cavities with heavy mallet force. At varying



intervals six of these fillings were crushed in the dynamometer. Their average crushing strength was 514 pounds.

At about the same time I made the same number of fillings, using the same alloy with the same percentage of mercury, ground in exactly the same manner, but the excess mercury was removed by pressure between the thumb and finger. These fillings were condensed with ordinary hand pressure. They were crushed in the same manner and at the same age as the other fillings, and their average crushing strength was 385 pounds, or, a gain in strength of 129 pounds or 133½ per cent. in favor of heavy mallet force, and a minimum of mercury. The amount of mercury can be reduced to a point when the mass will not be held in a strong united form. But this is not one of the common errors. Most amalgam is manipulated as a sloppy paste and crowded into the cavity with a ball of cotton, ball burnishers, and troweled up at the margins with any convenient instrument, after which the filling is given a brilliant polish, with a strip of rubber dam. Is it not to the credit of amalgam that it will live through such abuse?

The methods of amalgamation are various.

**Methods of
Amalgamation.**

Many men attribute their success with amalgam to their particular method of amalgamation. There are those that use a rubber finger stall or a piece of rubber dam; some do their mixing in the palm; others wash their alloy in weak acids, alcohol or ether, and amalgamate the fillings while wet, and there are still many other methods. I find by experiment that they may all be right, so much depends upon the alloy they are using, what method they must pursue to amalgamate it. To-day we are confining ourselves to a consideration of the high percentage silver alloys. Experiments and experience show that it is best that they should be first thoroughly ground in the mortar. The time required will vary according to the amount of alloy we are mixing, the percentage of mercury we have with it, and the pressure and speed with which we work. It should usually require from one to three minutes to accomplish this part of the work. The mass should be thoroughly ground for some time after it appears to be smooth, and then removed to the hand for thorough kneading or rolling. If at this stage there appears to be an excess of mercury, such as to make the mass sloppy and not capable of being well worked, this excess should be squeezed out between the thumb and finger and the kneading continued. This process requires about the same length of time as the grinding process. If the mercury has been kept down to the proper stage, soon after the mass has become thoroughly smooth and plastic, it will begin to stiffen and show signs of setting, when it should be immediately introduced into the cavity. It is important that the mass should



be of the right consistency, and the correctness of this consistency depends upon the operator's ability to pack the amalgam perfectly to place. If the mass is too soft, it will be jelly-like, and tend to spheroid and draw away from the walls. Such a filling would be worthless; it would not be tight, would flow badly, and lack in strength.

I have been able to prove that it is possible to make the strongest filling with amalgam that is worked very dry. Yet while this is possible, I warn you that it is very difficult to get perfect adaptation and condensation with such amalgam. The amalgam should at all times be sufficiently plastic to admit of its being perfectly adapted to the cavity, and all mercury in excess of this should be removed. An excess of mercury is dangerous to the success of our filling. Amalgamation is not a chemical change, and mercury in amalgam is the same as mercury in a thermometer or any other place. If there is an excess, it will be driven back and forth in the alloy granules as it is affected by thermal changes, and a subsequent effect will be produced in the strength of the amalgam. Too much mercury diminishes the strength rapidly; too little mercury will cause the amalgam to be brittle and will prevent perfect adaptation.

The ratio of alloy to mercury should be determined for each lot of alloy and properly weighed before mixing, although the effect of removing any excess of mercury is not very serious, it is a safer plan to have about the right quantity. I find that it is seldom necessary with any alloy to use more than six parts of mercury with five parts of alloy, and then there is usually an excess of mercury to be removed.

I wish to warn you that those qualities in an alloy that are generally regarded as easy manipulation are most surely opposed to good results. The predominance of the metals that make manipulation easy do not produce the best and most permanent fillings.

There are two points I must briefly emphasize before closing this already over-long paper. Complete your operation by thoroughly trimming all margins flush, and thoroughly and carefully polishing the filling the same as you would polish a gold filling, of which you were proud. It will be better for the tooth, the patient and the dentist's reputation. Anything that is worth doing is worth doing well, and one could not be justly proud of an amalgam operation unfinished. And last, have the courage and manhood to demand a fee which will be a fair compensation for the good you have done. If you do not get such a fee you will surely hesitate to do your best and improve on your operations in the future. There is no filling material with which we can do as much permanent service for our patients in a given time as with amalgam. Is it fair to the patient to give him just an ordinary amalgam filling for, say

**Finishing
Fillings.**

before closing this already over-long paper. Complete your operation by thoroughly trimming all margins flush, and thoroughly and carefully polishing



one dollar, which might last a few years, when his teeth might be permanently saved by careful work, requiring five dollars' worth of time? I know something of the problem of saving teeth for those who cannot pay large fees, and I know some of these unfortunates are in better condition, because it was necessary for them to have large amalgam restorations, while their apparently more fortunate brothers were decorated with gold crowns and other alveolar appurtenances.

Discussion of Dr. Crandall's Paper.

Dr. L. A. Cimerman, debt of gratitude for the work he has described in **Fort Plain, N. Y.** his paper. His experiments have verified the findings of Dr. Black. Dr. Black has been our authority on this question of amalgams for a number of years. Now that Dr. Crandall has taken up the problem, and, working it out from different angles, arrives at practically the same conclusions, we are nearing the scientific solution.

Papers of this character are as "bread thrown upon the water;" they will yield good to every thoughtful dentist. We will not all accept all of the ideas advanced in their entirety, yet we will be influenced in our work and ultimately may follow the methods advocated.

It is not an easy matter for one who has been working along certain lines for fifteen to twenty years to make radical changes. We grow into these new methods slowly.

Personally, I am one of J. Foster Flagg's disciples, and I doubt if any man was ever more conscientious in his work than Dr. Flagg. He taught us to make our own alloys, using zn. cn. and gold with the different formulas. In the early nineties his clinical experience was of value, especially when backed up by records.

But time is no respecter of persons or methods. We must accept the undisputed laws that govern our work.

The author speaks very plainly and emphatically on "adaptation and condensation"—very important points. However, there is a question in my mind as to his method of obtaining adaptation and condensation. Serrated pluggers have been advocated and I have tried them (without the mallet, however), but returned to the old ball burnisher. Amalgam is a treacherous material. If direct pressure is applied, the top will be condensed at the sacrifice of the other portions. And unless pluggers are used of the right size and shape for each individual cavity, I have grave doubts about good condensation and graver doubts about the adaptation.

Presumably many here have removed old amalgam fillings of fifteen or twenty-five years of service and found that it was necessary to drill out *every* portion of that filling. Very small particles on the floor or walls of the cavity were removed with nearly as much difficulty as exyphosphate cement.

Also, have you ever noticed your mortar the next morning if your assistant had not cleaned it the night before, and found thin scales of amalgam adhering to its sides? And did you try to remove those scales by brushing them out with your finger? You will find those scales hard to remove when you consider the flat, smooth surface they are on. And further, water standing in the mortar several days will not loosen them, hence we must conclude that there was good adaptation. And how was it secured? *With a ball burnisher.*

Now, if we can burnish the amalgam to the walls of the cavity as accurately as to the mortar, we certainly will have watertight fillings. The burnishing must be from the centre to the walls of the cavity with sufficiently large burnishers, beginning with a small amount of amalgam and using smaller burnishers at intervals. Sufficient pressure must be used in the cavity as well as in the mortar.

Dr. Crandall uses some strong language when he speaks of the use of the matrix, and he is certainly justified, for an amalgam filling put in without pressure would be as serviceable as a gold filling put in without pressure. And, again, in using a "sloppy mix" it is *impossible* to use pressure, even though a matrix is in position.

I must agree with Dr. Crandall's arrangement of "chief causes of amalgam failures." Cavities carelessly prepared will never hold serviceable fillings. Careless or indifferent work of any character never pays. Five of the seven causes enumerated are under the direct control of the operator. There is not a man practicing dentistry but can, if he conscientiously tries, prepare good cavities—he can condense and adapt his amalgam fillings and can finish his fillings so that they are smooth and of proper contour.

So far as unbalanced alloys, or alloys that flow and fracture, are concerned, that is beyond our reach. The manufacturers are not to be criticised for what they give us. We have not asked them to experiment with each melt to determine the exact balance. It is up to the profession to require such alloys, and I sincerely hope that before our days of usefulness have passed, some reliable alloy will be marketed, that when we reach the great Beyond our immortal spirits will not be impeached for the black ditches we have left behind.

"Common Sense in the Treatment of 'Riggs Disease.' "

By HOWARD T. STEWART, New York City.

A friend of mine asked me what was to be the title of my paper. I told him it was "Common Sense in the Treatment of 'Riggs Disease.'" He said, "What a foolish title!" I said, "Why do you say that?" He said, "There is no common sense in treating Riggs disease. Nobody but a d——n fool would treat it." And there is much to make us partially agree with this friend. However, if one is going to treat it, I know of nothing that will require a larger stock of good common sense.

Truly, we meet with the most profound discouragements, and I will take occasion here to say that the man who gives up a good general practice to embark entirely in the treatment of Riggs disease begins a most dangerous voyage, and unless he is peculiarly fitted for the work, and unless he is to a certain extent financially independent of his practice, he should best think several times before he does it, and then he should better be sure that he would rather treat Riggs disease for fifty cents than to do general practice for a dollar. For, no matter how successful he may be, the chances are that he would, with the same ability, have made more money in the general practice.

Moreover, you may rest assured you are entering a very unpopular vocation. The fixed belief that this disease cannot be cured has so long held sway over the dental mind, and more particularly over the medical mind, that when you pose as a man curing this disease, a certain proportion of the profession will regard you with grave suspicion, and some with the utmost hostility; some will be inclined to regard you as a man who has failed to "make good" in general practice, and who has taken up the treatment of Riggs disease as a sort of advertisement, and no matter what you may show them, the majority of these will be of the same opinion still. Dr. Riggs himself suffered much from suspicion. I am speaking now of that proportion who actually believe these things, and who are determined to continue to believe them.

All this is not entirely without justification, for if there has been anything in dentistry that has been abused to the last degree, it is the treatment of Riggs disease. So many cases have been treated and only the most temporary results obtained; so many men have deceived both themselves and their patients in regard to this treatment that, to a large extent, the medical profession, the dental profession, and the people generally, have good reason to be exceedingly sceptical.



There are, of course, a large proportion of the profession who will believe in you and who are perfectly honest in their expressions about it, and still a smaller proportion who believe in you and your work and who will refer a patient to you occasionally. This proportion is very small.

I do not mean to convey the idea that only a very small proportion of men in general practice are treating this disease in their private practice—not at all.

Far more men are treating it and getting good prophylactic results than ever before, and the proportion will continue to increase and it should increase. The number of general practitioners who do this work successfully must very greatly increase if the people are ever to get anything like the service along this line that they need.

There is enough Riggs disease in New York City alone to keep a thousand specialists busy every minute of their time, and this, mark you, in addition to all the work which the general practitioner is now doing.

In other words, if all the Riggs disease treatment was done just as it is now done, there would still be more than enough left (that never will be done) to keep a thousand specialists busy—and then some to spare.

I will put it in another form:

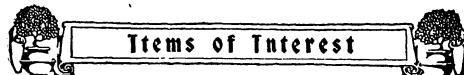
Two hundred thoroughly trained and efficient Riggs disease specialists, working seven hours per day strictly on Riggs disease treatment, could do more for curing Riggs disease and keeping it cured than is now done by all the specialists and all the general practitioners put together in New York City.

One thousand specialists could not do all that is necessary.

More than seventy-five per cent. of the adult population have some form of Riggs disease which needs treatment and constant after-care. Take this home with you and figure it out for yourself, and if you know Mr. Rockefeller well enough, tell him the real situation from a health standpoint and get him to endow an institution to further the treatment of Riggs disease generally. No other institution in its influence on health would be so far-reaching in its results. Absolutely no other health movement would so generally affect the human race, or be capable of so increasing the longevity and efficiency of civilized man.

This is a very strong statement, but it requires only a little thinking to see that it is true.

In undertaking the treatment of this disease it
Characteristics is well for both dentist and patient to understand
of Riggs Disease. that a cure is often difficult to obtain and sometimes difficult to maintain; that it requires their perfect co-operation; that while it is often very slow in its



progress, it is usually as certain as death; that it means not only the loss of the teeth, but the constant infection of the whole system from the bacterial poisons formed and absorbed into the system—some systems having, of course, more immunity to this infection than others. These bacterial poisons are absorbed, as Dr. Alonzo Nodine has so admirably pointed out and emphasized, through the pockets, the tonsils, mucous membrane of the mouth, the stomach and the intestines, and he shows how these produce the various systemic diseases.

It should be understood further that these conditions of the mouth are, to begin on, brought about by some wrong systemic condition, the majority of these being of a slow, insidious, chronic nature that give little warning and comes on almost like old age. They are, for this reason, more dangerous than the acute disease that cause the patient to seek immediate relief. There must be entire eradication of the disease from the gum, the peridental membrane and the alveolar bone. If any inflammation remains at any point, it is liable to slowly extend into the entire alveolar body.

Talbot has pointed out to us that this disease is inflammatory—that it is not infectious—that the infection comes after the inflammatory stage begins. It is the inflammation and not the pus that causes the absorption of alveolar bone.

This inflammatory stage often begins many years before the infection takes place, or before the patient notices anything wrong or even before the average dentist would, after close examination, pronounce it to be Riggs disease.

Talbot says: "The disease is admittedly on the increase."

**Effects of
Climate on
Riggs Disease.**

People living in cities and spending their lives in the house are more subject to it than people in the country or those living out of doors. Hunting dogs and dogs sleeping out of doors are much less subject to Riggs disease than pet dogs of the house. I have examined the mouths of many hundreds of hunting dogs in the South who stay out of doors practically all the time, night and day, and I have yet to find a case of Riggs disease among them, but the pampered pet house dog is very subject to this trouble. This alone shows clearly the effect which diet and living have in producing or preventing Riggs disease.

I have also examined the mouths of hundreds of negroes in the South, and I find that the plantation negro is far less susceptible to Riggs disease than the house negro in the cities.

Talbot also points out the effect of climate in producing Riggs dis-



ease. A volunteer from Montana, twenty-three years old, lost nearly every tooth in nineteen months' time in the Philippines. This, of course, was due to the very radical change to an unaccustomed climate. He shows further than out of a hundred and twenty-seven soldiers, fresh from the Philippines, that only eighteen were free from Riggs disease; and, further, the very interesting fact that while the age of the men examined ranged from twenty-one to fifty-two, the largest number was among the men aged from twenty-one to thirty. He also points out that people living in the Northwest, where it is extremely cold, and where they live much in hot rooms, suffering from the extremes of cold and heat, are more subject to the disease than people living in a temperate climate.

I mention all these things to emphasize the fact that it is only common sense to take into consideration environment and systemic conditions, and to show how foolish it is to ignore them.

Talbot speaks of these conditions as setting up "an inflammation in the capillaries of the alveolar process," and says: "No matter how short a time the cause may exist, if the inflammation is once set up, owing to its peculiar action in the alveolar process (even though the cause be removed) interstitial gingivitis becomes chronic and the destruction of the tissue continues."

In speaking of the atrophic form of the disease, Kirk says: "Just what are the poisonous substances contained in the blood stream that, when carried to the alveolar tissues, set up the decalcification process (the halisteresis of the bony sockets of the teeth) is not known, nor do we know by what agency these toxic irritants effect their results."

To control this inflammation and to keep it controlled, in addition to the local treatment necessary, there are numberless systemic conditions that may be considered. One of the chief among these, probably, is the elimination by way of the intestinal canal. This, comprehensively considered, is so great a field that in a certain sense, directly or indirectly, it contributes almost to the entire realm of general medicine.

One thing about which we are much concerned **Constipation.** is habitual constipation. Whatever may be the cause of constipation, whether it be from torpidity of the colon, from too much animal food, or the *wrong kind* of animal food; whether it be from the nervous tension of modern life; whether it be from lack of exercise or physical development; whatever may be the cause, a determined effort should be made to overcome it, and especially to keep the bowels well open and the system as free from auto-intoxication from the intestinal canal as possible, until we get a proper healing of the tissues. Most people imagine that if they have a move-



ment each day they are never constipated. One may, through habit, at a certain time each day, have a movement and still be very much constipated, because the peristaltic action may be weak and may only partially evacuate the bowels. Besides this, once daily is not enough. The animal creation generally could not remain healthy and have one movement a day—why, then, should man? Having one or two movements a day is pure habit—a habit cultivated for generations. For perfect health, two movements a day are essential, and these should be free and full movements. No one thing will contribute more to general health and length of life, and no one thing will do more to prevent an attack of Riggs disease after we have cured the case.

Man, we are told, is born with the intestinal canal bacteria free, but it is soon invaded by micro-organisms. The adult passes in the faeces from thirty to fifty billion bacteria. Most of these are harmless under usual conditions, but when these conditions are changed they are capable of becoming pathogenic. If these are retained in the bowels instead of being evacuated, think of what dreadful conditions this continued retention from day to day and year to year may mean!

Some authorities go so far as to say that (excluding the infectious diseases) ninety per cent. of all sickness is due to auto-toxemia from the intestinal tract. If this is but half true, what a serious matter it is in producing all those various systemic conditions that accompany and cause Riggs disease.

To deal successfully with habitual constipation is often exceedingly difficult for the most skilled physician, and in these cases it is very often advisable to consult with a specialist or to turn the case over to him entirely. I know it is usually difficult for a dentist to consult with a physician, especially the regular family physician. The dentist is placed in a peculiar position. First of all, the physician (generally speaking) has no respect for the dentist's knowledge of medicine, nor for his opinion—and usually this lack of respect is well-founded.

The physician usually thinks that, as there seems to be nothing especially the matter with the patient, it is useless to consider a course of medicine or diet or habits simply because there is some inflammation of the gums or looseness of the teeth. Nearly everybody has it, so why make such a fuss about it? And he treats the dentist with good-humored consideration, but does little or nothing in the matter.

It is with the physician as with the dentist—he must understand the insidious chronic conditions accompanying Riggs disease, *causing* Riggs disease, and *being caused by* Riggs disease—the vicious cycle. Further, he must be in sympathy with the proceeding, or the co-operation is a failure, and usually results in humiliation to the dentist.



The patient catches the physician's spirit and feels that it is something of foolishness—that the dentist is wading into water beyond his depth—that all he should think about is what he can do *in the mouth*.

Then, just as soon as the gums are healed and apparently well, the patient wants to pay his bill and get away, feeling that to do anything more either as to systemic treatment, diet or after-work on the gums and teeth is unnecessary—is a waste of time and a sort of graft on the part of the dentist.

It is then perfectly clear that even the thoroughly capable dentist cannot co-operate with all physicians.

**Treatment
Under Varying
Conditions.**

If you find nothing else the matter with the patient physically, if the local conditions yield readily to local treatment, then by all means give the local treatment and let that end it, with possibly a little good advice as to diet and mastication and proper living, and which you know before hand your patient will take good naturally and absolutely disregard.

In such cases it is only common sense to treat locally and depend on prophylaxis.

Again, even if the patient is living a radically wrong life—if he is indulging in high-balls and “wasting his substance in riotous living,” and you know it, and you know he is going to keep on at it, then it is only common sense to give him the best local prophylaxis you can at stated intervals, and you will often be astonished at the results obtained and kept; but it is not common sense to tell that patient he is *cured*, and let him go away with this idea simply because the flow of pus has stopped and the teeth have tightened and a beautiful pink and healthy condition of the gums follows. All this is no sign that he is cured (at least, as the patient understands a cure), and unless we tell him he is liable to a recurrence or to gradual dissolution of the tissues, even with good after-prophylactic care, this patient will some day think that we either were not honest or did not know our business.

I would not for one moment be understood to undervalue the magnificent work done by the prophylactic men working along these lines, the result of which are a delight to see; but neither would I have it thought that all saveable teeth can be saved by purely local treatment, because they cannot.

We may cure the mouth and for a long time keep it practically cured by constant cleanliness and stimulation locally, but we are, as it were, *covering up the symptoms that warn us of the systemic or organic disease, that may result in cutting off several years of the patient's life.*

When we think of it in this light we can readily see what a solemn duty devolves upon us, as *we are in a position to do more than any other class of men to anticipate serious trouble and guide people into the hands of the medical specialists.*

**Symptoms
and Diagnosis.**

The one chief idea I would urge is the study of the diagnostic signs of the mouth leading up, of course, to general symptoms as well. Accompanying Riggs disease are certain differing symptoms, certain different peculiar appearances that characterize the surrounding tissues in different systemic conditions, not always constant, it is true, but sufficiently so to lead us to investigate other symptoms. These symptoms and appearances are recognized only by long experience and observation, so that it comes almost as intuition. Only a short time ago your essayist had under his care a physician, aged thirty-eight. This man was robust and vigorous, enjoying good digestion, a fine appetite, and apparently in perfect health. There was a profuse flow of pus. Patient was discouraged as to the condition of the teeth because he had been treated twice with no advantage, and he said he believed there was no cure for Riggs disease. About these teeth we found a peculiar appearance of the gum that often precedes or accompanies kidney trouble. The patient laughed at the suggestion that there was some systemic trouble behind the mouth trouble. He said there was no healthier man in New York City, and, indeed, he looked it. Nothing more was said about the matter, but the local treatment was pursued vigorously until the pus had ceased to flow and the gums retracted in apparent cure. The patient was delighted with the result. I had been closely watching the gum tissues, as I find more can often be definitely ascertained after the gum heals from local treatment than before, while so much inflammation is present. There still remained a certain shape of the gum septum and a certain peculiar appearance that is impossible to describe which are symptomatic.

Physical examinations were then made, and after repeated tests he brought me the report of Bright's disease.

I am now watching the case with intense interest to see what the systemic result will be, since the discharge of pus into his mouth has ceased and since he has begun to diet rigidly. He would not diet at all before this.

This brings us directly to the fact that many times *serious systemic or organic troubles may be suspected and then diagnosed from early symptoms in the mouth, when they would not otherwise be suspected until a much later date.* Think what this means and what a field it opens up for the dentist! Think of what it means for tuberculosis patients and those with a tendency thereto!



Some years ago I warned a little woman who is now in Colorado that she was in a rundown condition, and that she should change her mode of life and do something to build herself up; that if this was not done we could not hope for the best permanent results to her mouth, and that such conditions sometimes resulted in tuberculosis. She was at this time under the care of her physician, who suspected nothing except "anæmia"—that name that covers a multitude of sins. The advice was disregarded, and later an examination showed she had developed tuberculosis.*

And think of all the various chronic diseases slowly brought about in our "present-day civilization," the beginnings of which are quickly reflected in the mouth if only we are able to read the signs. No wonder that great man, Dr. Charles Mayo, said the next great field of preventive medicine should be opened up by the dentists.

But I do not think Dr. Mayo himself thought of the possibilities of diagnosis from the early symptoms in the mouth before the formation of pus occurs, or even before the patient has any inkling that he is physically out of gear.

I certainly did not intend to write at so great a length on these things, but I am so impressed with the importance to the human race of the inter-relation between systemic conditions and oral manifestations, and I am so impressed with the extreme value of mouth signs as early warnings of approaching systemic disorders, that I believe a stimulation of interest in this direction may lead to a close and systematic development and classification of mouth signs (now only in its infancy). These will be ultimately of more value than all the elaboration possible of methods and procedures to stop the flow of pus, to eradicate inflammation and to tighten the teeth.

I predict that before very long, not only the specialist in Riggs disease, but the general practitioner in dentistry, will devote himself so assiduously to observing early signs in the mouth of systemic changes, that then indeed will dentistry have opened up, not only the next great field of preventive medicine, but will have opened up and *occupied* the greatest field of preventive medicine.

Medicines Used in Treatment of Riggs Disease. The question is often asked, what medicines are best to give for treating Riggs disease systemically? Of course, the question is always asked without really thinking, for it is almost like asking a physician what medicines he uses in treating general chronic sickness.

"Then," some one says, "your idea is that a man shall practice general medicine?" Not at all. The nose and throat man does not practice

*I invite personal correspondence from all who have made a study of these signs.—H. T. STEWART.



general medicine, but certainly he is supposed to have some considerable ability to diagnose general diseases and to refer cases to the proper medical specialist, as well as to administer medicines for certain conditions and to regulate diet and habits of living.

Some of these things are essentially within the domain of the dentist treating Riggs disease and not the physician. However, he must be prepared for this, as there is grave danger of administering medicines for symptoms, behind which may be serious trouble of which he may be ignorant, a trouble that would be found by the physician after thorough examination.

The only rule to follow is to be sure there is nothing the medical specialist should handle before we essay to handle it alone.

Talbot says: "The examination of the urine is the only means at hand of ascertaining the general condition of the system underlying interstitial gingivitis." Those interested in such examinations will do well to refer to Dr. Talbot's late work, which he calls "*Interstitial Gingivitis and Pyorrhoea Alveolaris*."

In speaking of acid auto-intoxication he says: "If the kidneys do not carry off the surplus acidity, a greater strain is put upon the lungs, skin and mucous membranes of the mouth. The alveolar process and gums, being doubly transitory as well as end organs, contain excretive as well as secretive glands.

"The gums are the first structure of the body which indicate systemic defects."

I put the last statement in italics to again call attention to the opportunities of the dentist to make early diagnoses of troubles that would entirely escape the physician—in fact, which the physician would have no opportunity to investigate—and some day, generally speaking, a physical examination will include an investigation of the condition of the gums and mucous membrane of the mouth, as well as the lungs or the kidneys—and the examination will begin in the mouth.

It will be noted that somewhat more stress has been laid on the effect of systemic conditions as causing Riggs disease than on Riggs disease as causing systemic conditions. Lately our dental literature has teemed with the most graphic pictures of systemic infection from Riggs disease. Everything from stomachache to heart disease has been attributed to it, and in such a way as would give the uninitiated casual reader the idea that we had suddenly found the cause of all systemic infection, the origin of which was heretofore unknown.

A physician of wide reading and scientific acquirements said to me, "You dentists are running mad on this question of pyorrhea."

**Riggs Disease
as a Cause of
Systemic Disease.**



He spoke of how the sinuses discharge sometimes spoonfuls of pus each day into the stomach with no appreciable systemic effect. He says, "The medical profession have begun to laugh at your literature."

Now, however much excuse there may or may not be for this view, certain it is that we are, in our enthusiasm, in grave danger of attributing to Riggs disease, results out of all proportion to the actual existing facts. True it is that Riggs disease can, and does, produce the most serious systemic disturbances—heart disease, rheumatism, kidney lesions, stomach and intestinal and nervous troubles, anaemia, ulcers, etc., etc. At the same time it may not be the wholesale cause of such a great proportion of these as we might be led to believe from some of our overenthusiastic writers; and we might do well to call a halt for further and more careful examination before we render ourselves ridiculous. "A little learning is a dangerous thing" is quite *apropos* just here.

Of course, when we see a profuse flow of pus from a well-developed case, we all wonder how the patient lives at all. With pus exuding constantly from about all the teeth, millions of bacteria of the most virulent type being swallowed every day, and this not for a month or a year, but sometimes many years, to figure how the system can offer the resistance it does to this condition is really beyond our ken. But if there was not a wonderful immunity enjoyed, and if each case presented the immediate dangers pictured in some of our literature, a larger proportion of the adult human race would be threatened with decimation.

The ravages of this disease are direful enough, but we must not lose sight of the fact that usually the same conditions that cause the systemic derangement *also* cause Riggs disease. It is to be remembered oftentimes, too, that while we can trace no infection of any particular part of the body, there exists a general rundown condition accompanying Riggs disease that clears up like magic when the mouth is freed from pus by local treatment.

It is true, too, that when Rozenow shows us the various changes that the streptococcus is capable of undergoing, and the many diseases it is capable of causing, we stand aghast at the possible consequences of systemic infection from oral sepsis.

Rozenow not only tells us that these diseases are possible from the streptococcus, but he actually produces these various diseases with this germ.

Local Treatment of Riggs Disease. Now, coming to the local treatment of Riggs disease, we have not time to take up all the procedures for prophylaxis and the various medicaments that are useful as local applications; and there are many, in spite of the contention of some that normal salt solu-

tion is all we should use. This is going to the other extreme, and certainly is not in accord with common sense.

The local operation your essayist has been using for many years (where the conditions seem to indicate it) I will describe briefly, giving you the main points. It will be clearly understood that this is not attempted in all cases and must be used with judgment.

Of course, it goes without saying that the field should be clean, or fairly so. A slight smear of phenol is made at the point the needle is to enter—this slightly anesthetizes the gum. The needle enters practically without pain; then the needle follows up the area of infiltration as usual. Novocain with adrenalin is the anesthetic used.

I like to get a rather deep anesthesia so there will be no pain in the operation.

A very small lancet that cuts on the end and sides is then carried to the bottom of the pocket, and then a little beyond the bottom of the pocket, sometimes going at this point to the edge of the alveolar bone. We then follow the pocket all around its margin, separating the tissue slightly from the tooth. If the pocket is very deep on the labial or lingual surface, it is sometimes advisable to slit the gum from the bottom of the pocket to the margin of the gum, making two flaps, which give way before the "scaler" and allow us to work freely. This usually causes no pain at all. The word "scaler" is put in quotations because we now want something more than scaling. Some years ago I presented to the profession the idea of scraping (or "planing") the cementum, removing the external surface. Very little notice seemed to be taken of this idea at the time, but since then a large part of the profession have come to regard this procedure as absolutely essential to a cure. Such instruments as the Carr, the Hoff and the Hartzell are designed for this especial purpose.

Men get good results when, as they say, they dig away long and very patiently and finally "remove every vestige of calculus," when maybe there was never any calculus to begin on. They get results because they are gradually removing the infected surface of the cementum itself while groping and scraping around after imaginary calculus.

What they have really been doing is scraping away something of the infected surface of the cementum, and they ascribe the results that follow to the supposed removal of calculus. It is perfectly true that in some cases they have actually removed calculus, and it is just as true that in many cases where they get the same result there was no calculus.

After making a slight incision at the bottom of the pocket (and there is usually no pain whatever connected with this), we then proceed to scrape the surface of the cementum down to the bottom of our



incision. The infected surface of the root is scraped precisely as we would scrape it if we had it out of the mouth and held a blade upon it at right angles; just as we would scrape a hickory stick with a piece of glass or sharp knife, getting off a very little bit of the entire surface.

I mean, of course, the surface of that part only that has been exposed by the pocket and the incision. In speaking of this, many listeners have in some way gone away with the impression that we advocated scraping the surface of the entire root. A moment's reflection will show us that we would have dug the root from its socket before this could be done.

In this operation we pay no more attention to the deposits of calculus than if they were not there, except, of course, to remove them so that we can then remove some of the cementum beneath. In other words, the calculus is not considered except as débris that we want to get rid of in order to begin our operation.

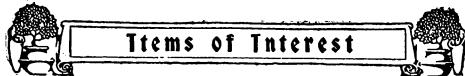
It is about as reasonable to expect proper healing and a permanent cure from simply removing deposits from a pocket as it would be for a surgeon, in an operation for carious bone, to simply remove the débris from within the wound itself and then expect a cure to follow from prophylaxis and stimulating applications.

After we have removed, as nearly as we can, a slight bit of the surface of the cementum, thus removing the very tenacious bacterial placques adhering thereto, we then carry a twenty-five per cent. solution of sulphuric acid in glycerine on loose cotton beneath the gum in contact with the scraped surface of the cementum. This acid, of course, first slightly decalcifies the root surface; second, it loosens up any particles of mucous placques still adherent; and, on account of its violent affinity for water, it is supposed to enter and combine to a certain extent with the contents of the exposed lacunæ. These lacunæ and cannaliculi were said by Clement, of Mississippi, to be partially obliterated in the external layer of the cementum of Riggs disease teeth. This cementum, he states, is hypercalcified and dense.

**Use of Acids
in Treating
Riggs Disease.**

Many years ago Dr. James Truman, after repeated and elaborate experiments with all kinds of medicines, came to the conclusion that the only ones that gave any real results (the action of the medicines only being considered without reference to surgical work), were the acids, and claims benefit from these only. He advanced no theory as to their mode of action. He recommended aromatic sulphuric acid applied in the pockets.

I am perfectly aware that where acids were advocated many years ago, that lately the tendency has been to get away from them, but this



is unquestionably a step backward and a serious mistake. The trouble was that too much was expected of the acid—that it was expected to take the place of the surgical work, and this no drug can ever do.

This acid is often beneficial, as I am in the habit of using it within the pocket during an operation, when it helps in removing the surface of the cementum on precisely the same principle that Dr. Callahan enlarges a root canal. At the same time it is sterilizing the cementum surface as nothing else will. Where we cut away the crown of a tooth, and where the root is in a desperate condition, it sometimes is helpful to gently force a weak solution of this acid through the apex by means of a soft rubber cone on the same principle utilized in pressure anesthesia.

In talking of the acid, I have gotten away from the operation. I neglected to say that the bottom of the pocket is usually pretty thoroughly curetted. The tendency lately has also been to get away from this, which is another mistake. I should much rather overcurette than to undercurette. The idea being advocated by many that we should go so carefully beneath the margin of the gum, and "gently and deftly" remove all the tartar without inflaming the gum, or wounding the cementum, allowing the gum to quickly and closely hug about the neck of the tooth after the operation, and without causing any soreness or discomfort, and in a day or two presenting the margin free from inflammation and beautiful to look upon (and it certainly does do this), is very attractive, but has been productive of much harm, so far as the really effective treatment of the disease is concerned. We have actually had men advocating the use of blunt instruments to push away the tartar without cutting the cementum. We have had men using an acid with the idea of attacking the tartar and of not affecting the cementum. Where is our common sense? Why should we want to keep the acid applied under the gum from attacking the surface of the infected cementum? If we are uneasy about the harmful effect of a slight amount of acid applied to the surface of a root, take an extracted root, paint a solution of the acid over the root surface; lay it away for an hour, then examine it and see if you think it would have been ruined if the same effects had occurred in the mouth! Then think of how much less effect it would have in a wet pocket and you can draw your own conclusion.

I will say that I have been using the acid constantly for many years, and have never seen the slightest ill result on the cementum. When I first advocated the scraping of the cementum I was using full-strength sulphuric acid, holding the pockets open after I had operated with an instrument and working the acid well down to the bottom of the pocket with an instrument. Of course, this was barbarous and totally unnecessary, and healing was very long in taking place; but the fact

that most excellent permanent results finally followed this procedure, and that no ill effects whatever resulted to the cementum, shows that it is perfectly safe so far as the root of the tooth is concerned to use almost any strength of acid in the pocket.

Furthermore, during all my professional life I have been using one-half of a one per cent. solution of sulphuric acid for cleansing the entire surfaces of the teeth, and I have never seen the slightest ill results from this procedure.

Just here it seems only fitting to say that whenever occasion arises we should esteem it a privilege to pay a tribute to the common sense but remarkable work done by Prof. Wm. J. Gies in his revolutionary investigation of acids in the mouth.

Furthermore, I have never used any alkaline solution to counteract the effect of the acid, either when used in a mild solution to cleanse the teeth or when used in a strong solution in the pockets.

In regard to curetting the pocket thoroughly and the application of a strong acid, causing inflammation and preventing the tissues from healing and causing scar tissue (these objections being so often urged), I will say that my observation teaches that this degenerate tissue should be curetted as a surgeon would curette degenerate tissue lining a womb, in order that new and healthy tissue may be formed, and that, as this chronic low form of inflammation has been so long present that an acute inflammation is not only not deleterious, but is exceedingly beneficial, and that tissue so operated upon will, after healing, much better resist the reincroachment of the inflammatory condition producing Riggs disease than tissues operated upon by the so-called gentle and deft method of removing the tartar.

To sum the whole matter up, we want a common sense and sane procedure in dealing with the systemic condition, and we want a clean-cut and really effective surgical operation in dealing with the local conditions. I take it that it is not necessary to say that in advocating this surgical procedure I refer only to the cases developed where surgery is necessary. Where we have simply a tumefaction of the gum tissue and a gingivitis caused by deposits just underneath the margin of the gum, and by the accumulation of filth and gelatinous placques, and where there is no real gum lesion, it is necessary only to cleanse the parts and to keep them clean. We can be as gentle and as deft about these cases as we please, and it is not necessary to be otherwise.

Conclusions.

In conclusion I will refer briefly to the following:

- I. I believe in "prophylaxis" (in its common acceptation) to the fullest extent.

2. I believe the signs of the mouth will be much more closely studied and are destined to play a very important part in medical diagnosis some time in the future. However, the study of these signs is now only in its infancy and suggests a field capable of great development when studied together by dentist and physician.

3. Vaccine treatment, in the essayist's opinion, has proved of no practical value in the treatment of Riggs disease.*

4. Acids applied locally are valuable. They loosen mucous plaques, decalcify and sterilize the surface of the cementum, stimulate a renewed vital connection between the cementum and the organism at large.

5. Just here it seems only fitting to say that whenever occasion arises we should esteem it a privilege to pay a tribute to the common sense but remarkable work done by Prof. William J. Gies in his revolutionary investigation of the effect of acids in the mouth.

6. "Scaling" teeth of tartar deposits does not and will not cure Riggs disease.

7. It is understood, of course, that the physician must as naturally refer patients to the dentist for the cure of some systemic conditions caused by oral infection as for the dentist to refer patients to the physician for systemic troubles that are reflected in the mouth or that he may otherwise suspect.

8. Where bridgework is to be applied to teeth after treatment for Riggs disease, it is only common sense that it should be constructed so as to be strictly hygienic and usually should be removable. It is also only common sense not to use one of these teeth as abutments. It does not promise to be permanent and does promise to act as a source of inflammation. It is only common sense that all lateral strain so far as possible should be avoided.

*I have come to this conclusion not only from my own observation of numerous cases but from the conclusions reached by men like Dr. Arthur H. Merritt; men who have the technical ability to manage Riggs disease without the use of vaccines. I do not draw my conclusions from the reports of men who use vaccines, and who depend on others to do the surgical work, ascribing to the vaccines the results that follow, and speaking of the surgical work merely as an adjunct. Neither do I draw my conclusions from reports made by men who do the surgical work, and who have taken up this treatment for a year or two and who report results in their enthusiasm, being prejudiced in their favor.

I refer especially to Merritt's experiments, as I know of no other man who has given *so fair a test* to vaccines, at the same time being most anxious that they prove successful, trying in numerous instances to see if he could be mistaken, even after being convinced of their uselessness; and yet after all, after seven years experience, being forced most reluctantly to say that he sees no practical benefit that has in any case ensued. In other words, being successful in his operative procedures and systemic considerations, he can see no possible way in which the vaccines have helped him to cure a single case.

This accords perfectly with my own observations, and this being the case, it becomes a duty to warn inexperienced men who would "rush in," and do harm—as certainly they must, if they do no good—we know little as yet as to the ultimate general effects of such treatment.

Such evidence as Merritt's should bear especial weight, as he tried hard to make the treatment a success but, *against his will, was finally convinced of the delusion.*



Lecture to the Bureau of Social Service, Morristown, N. J.

By JOSEPH KUSSY, Ph.G., D.D.S.

Oral Surgeon, Newark Beth Israel Hospital; Chief Oral Surgeon, Newark Free Dental Clinic Association.

For many years the medical profession devoted all its energies to the curing of disease. As the different maladies were encountered, various treatments and remedies were proposed and tried. Not always was there perfect unanimity as to the particular cure for a certain disease; many were tried and found wanting. But the day of enlightenment always came, until now only very few of the ills that man is heir to fail to respond to intelligent medical practice.

With the conquering of the dread disease came a new thought. Why should the human body be thus ravaged? Cannot epidemics be checked? Cannot disease to a large extent be prevented?

Then came vaccination. Frowned upon by many, ridiculed and rejected by many others, it has become firmly established as a preventive of smallpox. That dread disease no longer runs its riotous course unchecked. Many a life has been spared by its timely adoption.

Much of the horror of diphtheria has been eradicated by the use of anti-toxin. The typhoid epidemics of the army are things of the past. In short, the grand old profession of medicine has been awakened to the desire to prevent disease where possible, instead of permitting it to exist and then trying to cure it.

In a recent article written by Dr. Chas. Mayo, that great surgeon made the statement that the future of the science and practice of medicine lay in the preventive field, and that the main field in preventive medicine is the mouth. In other words, that mouth hygiene is the coming study for the prevention of disease.

The Mouth as a Source of Infection.

When you consider that the mouth is the gateway of nearly all infectious diseases, and that it is the most fertile soil, the best culture medium for the development of pathogenic bacteria in the entire anatomy, you will readily realize how all important the maintenance of oral hygiene is, even in a healthy body.

Tuberculosis, pneumonia, influenza, la grippe, diphtheria, measles, mumps, all have as their main means of infection the discharges of the mouth.

In the report of the medical commission for the investigation of acute respiratory diseases, New York Department of Health, Dr. Wadsworth says: "From an hygienic standpoint, the secretions from the



mouth constitute the chief, if not the only source of respiratory infection."

Severe cases of persistent throat inflammation and tonsilitis are caused by the infection from decayed or diseased teeth.

Out of 684 sarcomas in different parts of the body, 309 of these were found either to be on the lower lip, upper lip, tongue, or mucous membrane of either the soft or hard palate. One very frequent cause of these tumors is the constant irritation of a sharp edge of a decayed tooth. The teeth in the human anatomy are divided into two classes:

1. Temporary, deciduous or baby teeth.
2. Permanent teeth.

The temporary teeth are twenty in number; the permanent teeth number thirty-two. The first permanent tooth to erupt is the first molar at about the sixth year. Now, what happens when the temporary teeth are neglected? In the first place, decay in these teeth is more extensive and more rapid than in the permanent; the decay approximates the pulp more quickly; the child suffers unnecessarily; and frequently aveolar abscesses result and, alas! too often, the baby teeth are lost when they still had an important function to fulfill for several years. Their function primarily is to assist in the development of the jaws. When one or more are prematurely lost, the first permanent molar erupts anteriorly to its normal position; there is then insufficient room for the permanent teeth, and we find malocclusion, contracted arches, and then what?—mouth breathing. Caries of the teeth, or decay, as it is commonly called, is caused by the action of bacteria. These bacteria, formed by food particles lodging between and around the teeth, produce lactic acid, the acid that attacks tooth structure.

A perfectly clean tooth never decays.

Prevalence of Caries. The prevalence of dental decay is astounding and alarming. A recent compilation of statistics in New York City shows that about ninety-seven per cent. of the children in the public schools have defective teeth. You will readily understand that a large per cent. of these children are not in a position financially to receive dental care. When you learn, as has been shown, that it takes children with unhygienic, decayed teeth at least six months longer than it does children with clean, healthy mouths to make the eight grades, you will realize the importance of mouth hygiene as an economic problem.

The child with decaying, aching teeth cannot digest its food properly. It suffers from malnutrition; there is no concentration of thought on studies, and the failure to advance with the normal child is self-evident. Earache is a most frequent accompaniment of decayed teeth, and neuralgias of the head are in nearly all instances due to some dental defect.

In Cleveland, Ohio, at the Marion School, there have recently been conducted a series of experiments, remarkable in the results shown. Thirty children from various classes, backward in their studies, were selected as the principals in these experiments. It was found that in every case their mouths and teeth were in an unsanitary, neglected condition. They were put through a rigid course of mouth hygiene and their teeth were treated and filled, with the remarkable result that there was an increased average efficiency of fifty-seven per cent.

At St. Mary's Orphan Asylum, Worcester, Mass., the number of infectious diseases for many years caused great alarm: the average annual number being about 103 cases. It was found that by proper mouth hygiene, practiced among the inmates, this was reduced to an annual average of two, at which figure it has remained for several years.

Dr. Hunter, a leading specialist of London, has recently stated that fifty per cent. of the diseases of the alimentary tract were due to unsanitary mouth conditions.

Nature never intended that the mouth should be the harbor of disease, and yet it has become so by the degeneration of tooth structure, due to centuries of improper living, insufficient mastication and lack of oral cleanliness.

Dental
Clinics.

Now, as to dental clinics. I believe that I have shown you, and the medical authorities are in perfect accord with us, that the health of the individual is largely dependent on the condition of the mouth. It follows, also, that the health of the community is dependent on the health of the individual.

Aside from this, we know that epidemics spread by infection transmitted from one individual to another. From the report of the Health Commissioner of New York City we learn that the main means of such infection are the discharges of the mouth. Do you not then recognize the necessity, the urgency, of doing something to improve existing conditions? You and those dear to you are continually exposed to infection, in the stores, in public conveyances, anywhere and everywhere. A cough or a sneeze from some afflicted one might possibly be the means of infecting some one dear to you.

The dental profession has for many years felt that a great injustice was being done the public in general, and the school children in particular, by the failure of the profession to properly instruct the children in the public schools in the principles of mouth hygiene. With this in view, we appeared before the Board of Education, in the City of Newark, to ask permission to deliver lectures on this subject in the public schools. The board accepted the proposition unanimously; a corps of lecturers

was appointed. In the high schools, the pupils themselves were addressed on the subject of mouth hygiene and cleanliness. They were shown that, although the government had enforced the pure food law, which insists on the purity of all prepared food stuffs, that without mouth cleanliness the effects of the law were nullified, for this reason: The moment that this ideally pure food passes the lips into an unclean mouth, or one with decayed teeth, it makes a mockery of the law itself by associating with and being mixed with the most obnoxious, mischievous and oftentimes dangerous germs in bacterial life, and in this form it enters the stomach for assimilation. Of what use is our Pure Food Law Legislation? Where are its advantages if this all-important matter of oral hygiene is neglected?

In the elementary schools we went further. The nurses who have replaced the medical inspectors in Newark were themselves lectured to on the methods of instructing the children. The mouths of the little ones are thoroughly examined for dental decay and neglect, and if such exists, as it does in nearly all cases to a greater or less extent, the parents are requested to send their children to the dentist, and if the parents are not in a position to do this, the children are requested to visit one of the free dental clinics, and are granted leave of absence from school for this purpose for as much time as may be required.

We have two such clinics in Newark, and two operators and a nurse in each clinic, open every day from 9 A. M. to 5 P. M., except Sundays.

**Municipal
Maintenance
of Clinics.**

The first clinic was started a number of years ago with a number of volunteer operators, and was maintained by private subscriptions. The work grew to such proportions that the volunteers could not

keep up with it. In the meanwhile the municipal authorities became aware of our existence, and it was deemed wise to ask for an appropriation. We were granted one thousand dollars. With this we hired two half-day operators to be in continual attendance. Meanwhile the work kept growing in volume; the demands of our resources kept increasing. The newspapers were kept informed of our activities, and some of our board members, laymen, prominent in civic affairs, had a bill drafted, permitting cities of the first class to appropriate \$5,000 annually for the maintenance of free dental clinics. This bill was passed by the Legislature without opposition, because they had heard of the wonderful work we were doing for the poor, and we received the additional sum. We then opened another clinic.

Last year we grew very bold. Ours was a just cause. Of that we felt sure. We needed operators; some full-day operators. We had the unwavering support of the newspapers now; the clinics were under



close supervision; the city authorities knew of our activities, and the results obtained. In this connection it might be well to mention that it has been estimated that of the dental defects among the school children, forty per cent. are sufficiently severe to necessitate frequent absence from school. We now had a bill drafted by the city attorney, with the support of the city counsel, asking for an appropriation of \$10,000 annually, and this last year we received that amount. We are now contemplating opening another clinic. Permit me now to show you the results of our endeavors.

**Results of
Dental Clinics.**

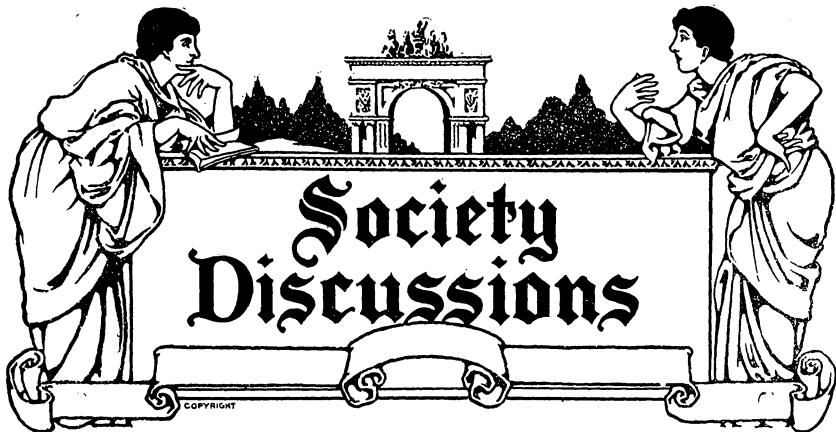
During the year ending December 31, 1913, the number of patients receiving dental treatment at the Market Street Clinic, which is in a remote section of the city, was 1,549, and the number of operations (treatments, fillings, extractions, etc.) was 9,913.

In the Newton Street Clinic the number of individuals was 3,921, and the number of operations 16,210, making the total number of patients 5,470, and the total number of operations 26,123 in only two clinics, and only children under sixteen years being accepted. These children are now referred to us from the parochial schools, as well as from the public schools.

The total cost of this work, exclusive of salaries, and our rent being free, was 1,596. The total value of the services rendered to the little ones, figured on the basis of very moderate fees, amounts to \$22,097.

Ladies, the opportunity is yours for doing a great work, a work which indirectly makes for higher citizenship and healthier motherhood.

The boys and girls of to-day, the men and women of to-morrow, will be better physically, morally and mentally, if this work is universally carried out. Yours is the opportunity to be pioneers in this movement here in Morristown. This is real, personal, social service. Every individual effort that you make in this direction will carry weight and gain momentum as the movement grows. It is such efforts as this that help to elevate and encourage the less fortunate ones, spurring them on to noble deeds and loftier aspirations.



Second District Dental Society of the State of New York.

March Meeting.

A regular meeting of the Second District Dental Society of the State of New York was held at the Kings County Medical Library Building, 1313 Bedford Avenue, Brooklyn, New York, on Monday evening, March 9, 1914.

The President, Dr. Lewis, occupied the chair and called the meeting to order.

The minutes of the last meeting were read by the Secretary and duly approved.

The paper of the evening was then read by Dr. Harold Stewart, and was entitled, "*Common Sense in the Treatment of Riggs Disease.*"

Discussion on Dr. Stewart's Paper.

**Dr. Paul R. Stillman,
New York.** By way of prelude, I wish to state that I was unable to obtain from Dr. Stewart the text of his interesting essay, and have heard it to-night for the first time. I did obtain from Dr. Stewart, however, a list of sixteen headings or notes on which he intended to construct his work, and it is from the following four of the notations which he gave me that I have based my discussion.

Note 1. "We must go more into medicine than formerly."

Note 2. "Dental literature is rife with systemic infections. We must also consider the immunity from these infections."

Note 6. "Dentists embarrassed in work with physicians because physicians do not think much of the oral effects on the system."

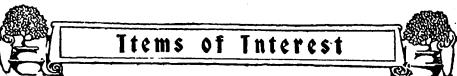
Note 10. "Local treatment deep and thorough—"cementum planed" or scraped—pockets and bone curetted followed with lactic acid or sulphuric."

Our essayist says, "We must go more into medicine than formerly," and by that he means that we should become more familiar with the work and thought of medical men. It is, of course, essential that the dentist should be a man of high academic training if he hopes to be rated as their equal, where the standard is one of brains and equipment. There is much complaint on the part of dentists of the seeming lack of interest physicians have for our achievements. It is true that the successful treatment of pyorrhea has been demonstrated by comparatively few practitioners of dentistry. The large majority of our best dentists fail to give to oral prophylaxis the attention which it deserves. The presence of gingivitis should become a warning to every dentist who believes in his heart he is doing his utmost duty by his patient.

Riggs disease is an inexcusable disease, for all the sequelæ dependent on the first gum inflammation may be traced directly to someone's neglect, and the profession is either directly or indirectly responsible. Whenever a dentist fails to treat a simple gingivitis or fails to explain its serious import to the patient, whenever he neglects to give proper instruction in the essentials of a mouth toilet, he falls short of his duty.

A septic mouth is often a most potent cause of many obscure and baffling systemic diseases. Let the profession of dentistry show the profession of medicine that it appreciates its opportunity by doing its full duty for the hygiene of every patient's mouth; that it recognizes and treats other diseases besides caries, and is able to cure them; for then, and not until then, will dentistry be recognized by medicine as a brother in the healing art.

There is a fixed belief among medical men that dentistry is a profession of slow scientific growth, and that dentists do not measure up, as the saying is, to the standard medicine has set for itself. In a broad sense, this is true, but in a sporadic sense, dentistry measures up with medicine in both science and research. It is to the individual dentist that the appeal must be made. I do not wish it to be understood that I think it is the duty of the dentist to leave his operating chair and go to the research laboratory. The point that I wish to make is that it is the duty of every dentist to treat and cure every inflammation of the gums in every mouth he sees, no matter how apparently trivial it may appear. Pyorrhea is always preceded by gingivitis, and unless it is treated in the early stages, the certain future destruction of the periodontal membrane is



inevitable. If dentistry would only rise to its duty as a whole, we could lessen the prevalence of pyorrhea by fifty per cent. in five years.

Use of Medicaments. Concerning the use of the so-called antiseptic solutions, germicides and astringents as advocated by the essayist, I believe they are contra-indicated

in the *surgical* treatment of pyorrhea. We must not lose sight of the fact that we are dealing with inflammatory processes that have been produced by bacterial invasion. Our surgery of the alveolus must be conducted with the accepted methods of modern surgery always uppermost in our minds.

When tissues, such as those that surround the teeth, have been infected for a prolonged period, they acquire to an unusual degree combative means of defense. The very presence of phagocytes in quantities assures us that nature is sending her army of defense to resist the invasion of these bacterial hordes. Each and every member of these millions of defensive leukocytes dies in battle, perhaps of indigestion, for he actually digests his enemy. The defensive power of the human body is beyond comprehension when we consider the attack upon it by its microscopic enemies. This normal defense must be conserved, and any application of astringents or escharotic germicides in solution or otherwise is an attack upon the normal defense. In other words, we are placing in the path of our surgical allies our best friends—the defending leukocytes, an additional enemy for them to resist. Our duty as surgeons is to invade this citadel with our instruments and literally tear down the fort to rake out the enemy into the light and air—not alone the bacteria themselves, but the very soil they live upon, house, home and chattels, for they are anaerobic bodies and cannot live and multiply in the presence of oxygen. It is the necrosed alveolar process and periodontal membrane lying deep down below the atmosphere of the oral cavity which affords protection to the infecting bacteria, and the inaccessibility of this peculiar structure about the roots of teeth makes possible the defense of these invaders. Their strategic position in the past has seemed well nigh invulnerable to surgeons, and were it not such a strong fortification the treatment of pyorrhea would be as easy as the treatment of furuncle, or common boil, for the infection is practically the same in both diseases. The only difference between them is this: The furuncle builds his house upon the sands, as it were, and the winds and storms of defense caused by the antibodies drives out the invading micro-organisms within a certain definite time, viz., the leukocytes always beat the boils; but the same bacteria in the more impregnable position of the alveolar lesion make the fight in pyorrhea quite a different proposition.

Riggs Disease
Versus
Pyorrhea.

The essayist seems to prefer the name Riggs disease in speaking of pyorrhea. Personally, I think there is as much reason for his preference as there is in calling the disease by any of its other numerous names, especially pyorrhea alveolaris. There are many precedents in medical nomenclature for honoring the names of those who have done great things along special lines, and the name of Riggs, before all others, is identified with this disease. But those who have written most on this subject seem to have settled down to the name pyorrhea, not because the name is a satisfactory one in its fullest descriptive sense, but for the fact that it has become the most widely used and most commonly accepted. Pyorrhea is but one of hundreds of things called "out of their name," as children say. The cavie has been persistently called a Guinea pig by the scientific men who use it most, yet its habitat is South America, and as it is a rodent, no stretch of the imagination could classify it with its porcine god-father. The nomenclature is loose and unsatisfactory because it compels those who discuss pyorrhea to use words which do not express their meaning. Rhein complained of this twenty years ago, and at that time gave to the profession a comprehensive classification which was based upon the pathologic symptoms which at that time were believed to be the important constitutional factors in its etiology. This classification was made by prefixing to the noun the lesion adjective, as diabetic pyorrhea, tubercular pyorrhea, etc. This was a most satisfactory advance in the nomenclature of that period, and had subsequent investigations proved Rhein's contention, viz., that certain systemic functional diseases of the heart, kidneys, etc., are the originating causes of pyorrhea, perhaps this classification would be in general use to-day. But the theory that from an oral examination dentists could ever learn to differentiate a pyorrhea due to a kidney lesion (as in diabetic pyorrhea), or an endocarditis, or a tubercular infection, or a gouty diathesis, seems futile. Yet we have come to know that endocarditis has its infection from streptococcus of pyorrhea pus, from a convincing report recently made of a case by Hartzell. We know from Grieves's report of a case of arthritis ankylosis, where the patient recovered complete use of the limbs by the suppression of pus generating in an alveolar abscess. The list of infections which have been attributed to oral sepsis includes no less than fifty widely distributed diseases.

The classification and nomenclature that Fletcher gave us some years ago is, to my mind, most comprehensive and flexible. Fletcher ignores the venerable Riggs, puts pyorrhea in the archives, and asks us to use the name alveolitis. Definition: "An inflammation of the alveolus," alveolus meaning in the region of the alveolar process; and to describe



the separate phases he observed he suggests these four prefixes: (1) Initial or simple; (2) Non-suppurative; (3) Chronic non-suppurative; (4) Chronic suppurative; the latter, chronic suppurative alveolitis, being synonymous with pyorrhea alveolaris.

Alveolitis is a name that all combatants in the constitutional vs. non-constitutional fight could unite upon, while in the Rhein classification a pre-existing constitutional cause is inferred. I do not *censure* our essayist for preferring the name Riggs disease to that of pyorrhea.

In suppurative alveolitis, the destruction of the gingiva and peridental membrane is invariably accompanied by a breaking down of the adjacent tissue. I believe that whenever the pus symptoms are present, a disintegration of bone has already taken place, and that pus never appears in Riggs disease until the alveolar process has been attacked. This is the theory of Fletcher, who says that no amount of gum treatment will cure the disease, and he states that this is evidenced by the fact that the gum tissues remain intact and nearly to their normal height long after deep pockets have been formed in the bone.

At the present time the etiology as described by Hartzell seems to be the most reasonable and convincing. My own clinical experience bears him out so far as I am able to deduce. You are all familiar with Hartzell's etiology, so I will not review it.

We dentists are just beginning to realize that we are concerned with one of the most troublesome bacilli that medical diagnosticians have to deal with. I refer to streptococcus pyogenes aureus. The appearance of this bacillus in suppurative alveolitis is constant, that is, it is always present in microscopical examinations of the pus. I quote Leary, of Boston, who has made many hundred tabulated readings. The streptococcus is insidious in its attacks upon the functional activities. It will generate in a pyorrhea pocket seemingly in a most innocent and benign manner, disclosing itself to the trained eye of the dentist only after careful examination by such men as are familiar with it, and who carefully search it out. To the "common or garden variety of dentist" it is non-existent. From the medical men it is able to hide so successfully, so far as its oral manifestations are concerned, as to reassure him that its origin is to be looked for in some other region than the mouth.

The human economy is capable of injecting large quantities of this bacillus by phagocytosis, and for a considerable length of time the system seems to show little discomfiture, but let the resistance become lowered



to a certain degree and a localized infection start up; then we may discover symptoms that baffle the most astute physical diagnostician.

It is in such a case as I am about to describe that the dentists who specialize in the treatment of septic oral conditions may be most helpful to physicians. This history was given me by the specialist who has charge of the case at present.

**A Case
In Practice.** Miss M. F., single, occupation bookkeeper. Age 28. Father and mother died with pneumonia. Two brothers living and well. Past history negative.

Present illness: Starting at girlhood, has had attacks of gas in the stomach and bowels. As she grew older these were accompanied with pains in the sides and up and down the back. These attacks might go away for months and reappear at short intervals. Six years ago had nervous prostration and was debilitated for six months. Last April, after overworking, became ill. She then became weaker day by day and there was more gas in the abdomen than ever before. Her appetite became poor and she lost weight steadily until now, when she is about thirty pounds underweight, now weighing about eighty-nine pounds. While she had always been *constipated*, since April she has had a marked tendency to diarrhoea. Her stools changed in character in the way that they were more foul smelling, and of late her menstruations have become irregular, now practically stopped. She has had a slight cough since last spring and gets night sweats. She has been in bed uninterrupted for twelve weeks.

A weak emaciated young girl, very anaemic.
Physical Examination. Heart and lungs normal. Abdomen very distended with gas. Mouth: A Riggs disease, affecting mostly the lower teeth. Examination of urine: Small amount of albumin. Culture examination of urine shows streptococci. Examination of stool shows a marked streptococci from the Riggs disease, causing a mucosal infection of the intestine and a general infection of the blood system, causing infection of the other organs of the body, namely septicemia.

I was called upon in this case to see what I would be able to do to alleviate the Riggs disease complication, for it was the deduction of the bacteriologist that this case was a streptococcus infection and it was apparent the generating location was in the alveolus. The patient had been running an irregular temperature ranging from 99.3 to 104 constantly for thirteen weeks. She was unable to sit up in bed, and I found great difficulty in operating. At the time of my third operation there has been marked improvement, and I found her for the first time with normal temperature. The pus flow had entirely ceased, and she was able to eat a lamb chop for her breakfast, together with cereal and cream,

etc. I have the case still under treatment, and a complete cure of the Riggs disease is certain, in fact, I am practically finished with my work. The prognosis is good.

**Dr. Nodine,
New York.** Dr. Stewart uses for the title of his timely and pithy paper, "*Common Sense in the Treatment of Riggs Disease,*" not perhaps realizing that nothing is

so uncommon as common sense about anything—not excepting our discussion of common sense. Yet I am reminded of what Emerson said in speaking of Plato: "A great common sense is his warrant and qualification to be the world's interpreter." Please do not think I am trying to unduly flatter either Emerson or Plato or suggest an analogy.

Another thing to which I would like to call your attention is that Dr. Stewart has changed his mind and reconstructed his ideas about Riggs disease in the last fourteen years. This is a very commendable and noteworthy achievement. Some men pride themselves upon the questionable temperament of never changing their minds. For a human being to exhibit such an intellectual deformity, and also to call attention to a condition of mental ankylosis is a bad precedent to follow.

**Co-operation
of Physician
and Dentist.**

Must we go into medicine more than we now do? I hardly think that advisable, as our field is sufficiently great to engage all our attention and energies. Yet I do believe this is a great field for the special dental diagnostician and consultant. I most certainly believe we ought to co-operate with the physician to a greater extent than we hitherto have done, yet the co-operation should not be all on one side. The physician ought to and must co-operate with us more than he has done. Both dentist and physician have lamentably failed and will continue to fail in solving many problems because of the failure of each to seek the other's special knowledge and skill.

The part which diet plays in either the cause or the cure of Riggs disease and other dental disorders to which Dr. Stewart directs our notice looms larger and larger as we look further into the subject. That part of our physiologies which treats of the chemistry of the body or books on physiological chemistry may profitably engage our attention. It was most surprising to me to read in my dusty and forgotten "*American Text Book of Physiology*" the pages about calcium, and to find that they fortify and reinforce McCann in his recent book, "*Starving America.*" Startling as the title of this book is, often we need such intellectual dynamite to jar us out of our smug and machine-made ideas and opinions.



Society Discussions

I heartily recommend this book to the few to whose attention it has not been called.

Prof. Gies suggests that he may produce demonstrable proof that there is metabolism going on in the enamel and dentine, which we hitherto have been led to believe were unaffected except by the oral environment. This will be additional reinforcement to McCann's contention, and brings us an idea that such men encourage the possibility of being able to eliminate most of our dental, medical and surgical ills by proper diet.

Further, as we look through so recently published a book as Mallory's "*Principles of Pathologic Histology*," bearing the imprint of 1914, we find on page 120, "*Calcification*." Here it states that lime salts are very commonly deposited in various homogeneous substances, the products of secretions and degeneration; and as we turn the pages of this book we find on pages 196, 652, 445, 628, 416, paragraphs which compel us to realize the continuity of thought, purpose and principles which underlie our conception of organic, systemic and local pathology. For our failure to realize this, and for our provincial point of view, we have been frequently and recently censured by the East and West, and to-night by the South.

The idea which I gain from this book, perhaps already familiar to you, is that calcification is the most common result of nearly all pathologic conditions. This explains for me the reason why the so-called serumal calculus is found on teeth affected with Riggs disease.

It is the result, instead of the cause, of pathological conditions of Riggs disease. It also explains that hypercalcification of the external layer of the cementum and the apparent density of the teeth in cases of Riggs disease.

In regard to disease beginning in inflammation rather than infection, this seems to me to be but half the truth. It is true that inflammation prepares a fertile field for infection, but it is also equally true that the body's or the tissue's resistance may be so lowered by other causes besides inflammation that the infection starts up an inflammation and makes easy further infection.

**Treatment
of Riggs Disease.** In regard to Dr. Stewart's method of treating Riggs disease, this is well worth our close and careful consideration. As nothing succeeds like success, and as Dr. Stewart succeeds in the treatment of Riggs disease, in conditions wherein acknowledged experts fail, any commentary of mine would be superfluous were I competent to discuss it. Yet it seems so reasonable and so in accord with my limited experience that I will certainly try to carry out the principles and practice he has given us.

**Vaccine
Treatment of
Riggs Disease.**

In regard to the vaccine treatment for the special and particular cure of Riggs disease having proved of no practical benefit, I feel sure that this coincides with the experience of many of those who have used it and justifies the practice of those who have not adopted it, but have employed other means. Why this is so I believe the opinion of that distinguished physician (British), Dr. H. D. Rolleston, covers the subject so well that I can do no better than quote from his paper, "*Vaccines from the Standpoint of the Physician*," published in the *London Lancet*, February 7, 1914:

"Curative vaccine treatments must be admitted to have disappointed the high hopes with which it began, and in this respect its history resembles that of most remedies.

"The problem of immunity is so complex that it is highly probable that the technique or practice rather than the principle of vaccine therapy is at fault, and that in time this may be so perfected as to establish the position of vaccines as a reliable remedy. The determination of the injecting micro-organisms is exposed to well-known fallacies and may be very difficult.

"Even with all due precaution, a wrong vaccine may be given and do harm. Possibly the condition of culture or artificial media may so modify the products of the micro-organisms of which the vaccine is composed as to render artificial inoculation far inferior to auto-inoculation. It has thus far been suggested that vaccines should be made from organisms grown on blood or other natural media.

"In chronic local infection of various kinds, such as arthritis and colitis, in which gradual improvement follows vaccine therapy, it is very hard to decide whether the credit is due to the treatment or to Nature unassisted.

"At the present time the results of vaccines are so uncertain that their use appears to be justified only when other more trustworthy therapeutic methods have failed or do not exist."

Further, if I am not encroaching on your patience, I would like to quote from another book, also by two British physicians, who have signally and significantly grasped the importance of the mouth as a source of infection, and the conditions under which we labor and the value of our efforts:

"Chronic Colitis—Herschell and Abraham, 1914. Infection may occur: 1, from the food; 2, from the mouth; 3, from the post-nasal space; 4, from a diseased appendix; 5, from local ulceration.

Infection from Food. "The mere fact of the patient taking an excess of animal food will usually result in intestinal putrefaction, and we are personally convinced that one of the chief causes of the prevalence of auto-intoxication at the present day is the large excess of animal food over the real requirements of the body indulged in by the majority of mankind.

**Infection from
the Mouth.**

"It is probably no exaggeration to assert that the commonest factor which determines given cases of atonic constipation will or will not pass into the stage in which it is complicated by colitis is the condition of the mouth. Quite apart from its efficiency as a masticating machine, the presence of centers of pus infection, from which millions of virulent organisms are swallowed with each mouthful of food, must be a constant menace to the integrity of junction of the gastro-intestinal tract. The chief protection which the human body possesses against infection of the alimentary tract is, as Boas first pointed out, supposed to reside in the secretion of gastric juice, which has the power when normal of inhibiting the growth of micro-organisms. But it would seem that this protective power of the gastric juice has been much overrated, for it must be remembered that it is secreted only periodically during the digestive periods; at all other times the stomach is defenseless against the germs, which in a case of oral sepsis are always present, ready to be swallowed with the saliva.

"Furthermore, there are many forms of indigestion in which the gastric juice is altered in composition and is devoid of that amount of free hydrochloride acid upon which depends its anti-bacillary powers. It is much more probable that the chief protection is the resisting power of the organism, since it can be raised by the injection of vaccine by which colitis can be cured.

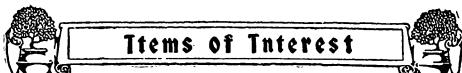
"Colyer, who has done a great deal of useful work upon the subject, thinks that although the organisms themselves acting upon the normal mucosa of the stomach may be able to give rise to a septic gastritis, it is probable that the chain of events is as follows: The food, imperfectly masticated and incorporated with infected saliva, undergoes excessive fermentation, with the result that sooner or later a catarrhal inflammation is started. The _____ exudates from the inflammation can grow and directly affects the gastric walls. The sepsis from the mouth escapes through the phycric opening and directly affects the bowels. Then we find associated with the septic gastritis symptoms of intestinal trouble, such as constipation and diarrhoea, and possibly some cases of mucous colitis.

"To some authorities, oral or nasal sepsis is of all forms of infection the most virulent in the production of severe degrees of colitis. Such a view may be expressed in a quotation from Pete Daniel, who, after reviewing the various contributory and determining causes of colitis, says: 'Lastly, I state dogmatically that in the case of primary (mucosa) colitis, if the patients are suffering from oral or naso-respiratory sepsis, they almost all develop into the ulcerative or necrotic varieties as a direct consequence of swallowing strepto and staphylococci, otherwise they remain cases of primary mucous colitis unless a blood infection of the colon occurs.'

"Page 72, Diagnosis.

"Examination for any source of infection.

"We have already pointed out that undoubtedly the commonest source of chronic septic absorption is from the mouth, the patient suffering from pyorrhea alveolaris or Riggs disease, and we should here



strongly impress upon the reader not only the importance of examining the mouth, but also the absolute necessity that he should examine it himself and not trust to the patient's statement that his mouth has recently been examined by the dentist and pronounced sound. While able and conscientious men who, fortunately, form the bulk of the dental profession, are quite alive to the importance of looking for and treating pyorrhea, there are yet some who, actuated by motives of expediency, prefer to ignore it. The treatment of pyorrhea is tedious and not at all pleasant to the patient, who is moreover unwilling to pay such fees as will probably compensate the dentist for efficient treatment. The patient cannot be persuaded that he is receiving value for his expenditure; he has no visible evidence of improvement, to say nothing of his difficulty in appreciating the influence upon his system of a mere local disturbance which causes him no inconvenience.

"When examining for pyorrhea, regard with suspicion any tooth from which the gum is retracted and press with the end of the finger or any smooth, rounded body against the edge of the gum in that situation. If pyorrhea is present, pus will be seen to ooze up around the neck of the tooth. Treat in a similar manner any other tooth around which the gums are reddened if there is no retraction, and finally the top of any gold crown or piece of bridgework. Having established the presence of pyorrhea, it is always an advantage to have some X-ray pictures taken of the alveoli in order to see how much damage has already been done to the process. ————— It may be noticed that a skiagram will demonstrate the existence of pyorrhea alveolaris before it can be detected by any other means. The small pictures obtained show two or three teeth in which can be seen not only the amount of long absorption, but also the presence of ramefying osteitis in the alveolar process."

Such expression of the understanding of the field in which we work is so rare and so noteworthy that I think the dentists of America, in fact, the dentists of the world, owe them some acknowledgment of appreciation.

There are many points in Dr. Stewart's most excellent paper which deserves a more careful discussion than I am competent to give, and I will leave that for those able to do so. I wish to express my thanks to the chairman of your Executive Committee and to Dr. Stewart for the courtesy and the opportunity to listen to and discuss this valuable paper.

Dr. Arthur M. Hunter, Brooklyn. Recently I heard a man ask in fun, "What was the largest island in the world before Australia was discovered?" No answer was made, and then the

questioner said, "Australia." The third man protested that the answer was not correct, because by the term "world" the known world was meant, and the world includes only such parts as were known at that time, or, in other words, that the world really was a state of mind.

To my mind the word "cure" is really a state of mind. The *Ameri-*

can Dictionary defines the word as "The successful treatment of a disease." It makes no limit on the time necessary for the cure, nor does it place a limit on the time necessary after the successful treatment to establish the cure. It has been said that it takes nine months to make a complete change in metabolism, and I believe that faulty metabolism is the real cause of this disease. The inflammation in the mouth may be either the cause of the faulty metabolism or it may be the result.

If for any cause such a malocclusion, injury or retained food particles start a focus of inflammation, immediately we have altered function through the whole system, for we have insufficient chewing, the carbohydrates are not thoroughly mixed with the saliva, some of the digestion of these are left to the pancreatic juices, the primary flow of gastric juice is not complete, until we have undigested food in the intestines, with the formation of toxins, lactic acid, etc. These are absorbed and carried by the blood to the various organs, and we have an altered saliva which has lost its inherent protective action, and the action on the original lesion is aggravated. If, on the other hand, we start with unbalanced diet or the retention of decomposing food in the intestines, we have the same process ending in the altered saliva, with the loss of the normal action of the same.

To establish a cure we must eliminate the cause. Therefore I believe with the essayist that diet and elimination are very important considerations in the cure of this condition. Are not some of the general practitioners demanding too much of the specialist when they want to know how soon a cure can be established? We are not putting in a piece of bridgework where positive statements can be made.

There is not the slightest doubt that we can control this condition by purely local treatment. We who are treating pyorrheal conditions see that in our practice every day. And we can maintain that control as long as our patients co-operate with us by keeping their mouths clean by means of gum brushing and reporting to us at stated periods. This applies to a very large per cent. of the cases, and very often such control seems like a cure.

**A Case
in Practice.**

I have a case which will illustrate this point. A man about thirty-five came to me with a very bad case. The destruction of bone was considerable, pus from every tooth, and also very badly crowded arches in the cuspid region. Before I started the treatment, a dentist friend told him that the whole attempt was useless; that I was bleeding him; that all I could do was to clean his teeth. And that was all that I did do. But by so doing I eliminated a very bad disease con-

dition. Now, there is not one point of irritation in that mouth except that which is the result of a fistulous abscess. The patient says that he feels very much better and is keener in every way.

This case was more in what has been called the first stages of the disease, a general inflammation with one or two pus pockets. The deposition of calculus was general and not in any great amount. At the first sitting I planed and polished the four lower incisors and instructed him in the use of his tooth brush. When he returned the next week there was a new deposit on those teeth that was larger than the one that I had removed, but with this difference, this was all above the gum line. He explained that he had followed my directions, and he was as surprised as I was when I showed the result of his work. On inquiry I learned that he had been a sufferer from chronic constipation, and at this time was having a relapse. I immediately advised the return to his course of treatment for that condition. The following week there was no new deposit nor has there been any since.

What does the man that depends on local treatment entirely do with a case like that? Does he give hygienic treatment every day? I do not believe that we can take the mouth as a thing apart from the

rest of the body and treat it as if it was out in the lot somewhere. Dr. Black has stated that by giving a saline cathartic one can stop the deposition of calculus for a period of three or four weeks, but after that time it will begin again. He also said that by giving a certain diet he could cause the deposition of calculus and predict the time of the commencement of the same.

Use of Medicaments. I believe with the essayist that it is necessary to not only remove the dead tissue, but we must get rid of the sick tissue also; but I do not believe that

it is necessary to use astringents or cauterants or sterilizing agents, such as he suggests. I think that the pain at the time of application and the resultant sensitiveness of those teeth is not necessary. Instead, I believe in bringing to the part a normal flow of blood, and I do it by the patients. I teach my patients gum brushing à la Fones, as I heard one man here state it, and I find that method much more efficient than any other could possibly be.

Vaccine Therapy. The best way to express my opinion of the use of vaccine for this condition is to tell a story that Dr. Fones used in his discussion of a paper on this subject before the Connecticut Dental Society last year. He said: "Without wishing to be discourteous, this method of treatment reminds me of an occasion upon which some people were pro-



pounding riddles. Some one asked, 'What is it that has no teeth, goes around on two legs and barks like a dog?' No one could guess the answer, and finally the propounder said it was a chicken. The objection was made that a chicken does not bark, and the one who offered the riddle said, 'I know that; I just put that in to make it harder.'

The man that uses vaccines has to be just as thorough in his instrumentation as the one who does not, and he does not eliminate the pus any more quickly.

I do not doubt that he can get rid of the pus by this method, but so can I by mine. And I do not make the patient feel that he is carrying around half the world on his shoulders, and that world gone wrong, as one of them told me.

I do not agree with Dr. Stewart on the necessity for the use of medicaments in the pockets, and certainly do not believe in the radical treatment which he advocates. It does not seem to be necessary. I am not afraid of the gum healing too soon. I believe with him that thorough instrumentation is necessary.

I depend upon the gum brushing for the curative agent, and to me that seems much better than any medicaments, especially sulphuric acid.

I think all the gentlemen who discussed the
Dr. Stewart. paper tried very hard to disagree with me and they could not. I feel thoroughly ashamed, I want to say, of not turning in this paper for discussion. I finished that paper to-night when I should have been eating my supper. I have never before had so many things happen all at once, which interfered greatly with the writing of the paper. I have been fitting up a new office, and in addition to that have had two sick children.

My only object in using the acid, I think Dr. Hunter misunderstood. I do not use it to get rid of any of the soft tissue, but more to attack the surface of the cementum itself. We possibly have not gotten rid of every bit of the bacterial placques. We do not always scrape it as well as we might think we do. Dr. Hunter is perfectly correct in regard to what he thinks about metabolism, and in his remarks as to a cure. I thank you all.

We have listened to four very interesting
Dr. Voelker. essays, and undoubtedly they will take up a good deal of space in the official journal. I want to compliment the essayist, and to move a very hearty vote of thanks to him and the gentlemen who have discussed the paper.

Motion carried unanimously.

Adjournment.



The National Dental Association.

The first meeting of the reorganized National Dental Association was held in Rochester July 7th, 8th, 9th and 10th, and, all things considered, must be pronounced a splendid success. There will, of course, be some who will declare otherwise, but these will mainly include those men who opposed reorganization, and who did not wish to see this meeting compare favorably with those held under the old regime.

In all fairness, however, it must be remembered that reorganization has effected radical changes, and it was not to be expected that the vast new machinery would run at once with as little noise and friction as the old. The executive men in charge were much in the situation of a bicycle rider who suddenly is asked to drive a six-cylinder, seven-passenger automobile. That the new big car ran at all, that it never swerved from the road, and that it arrived at its final destination, are all matters upon which the officers, delegates, local and other committees are to be heartily congratulated.

The House of Delegates.

Perhaps the most entertaining feature, to an onlooker, was the House of Delegates. Their proceedings were both humorous and inspiring. The humor cropped up from two main points of view.

It was positively funny to observe the attitude of what may be termed the Old Guard. Some of these tried so hard to boss things as in days of old; others walked around ridiculing all that occurred; while still



Editorial

others entered heartily into the new scheme of things and earnestly and successfully used their experience to aid in furthering the true purposes of reorganization. The conduct of this little band of men is much to be extolled; associated as they have been in the minds of many, as constituent parts of the Ancient Order of Little Bosses, they proved at Rochester that they have naught at heart but the rapid advancement of our profession. This was one of the healthiest symptoms noted, and largely contributed to a favorable prognosis as to the future of the association.

The other laughable occurrences, all of which were good-humoredly received, were due to the seriousness with which so many of the delegates pursued the duties thrust upon them by their election to the House of Delegates. Nearly all of the delegates were men who have been connected with their State organizations in executive capacities, and all seemed eager to take part conspicuously. This resulted in many unnecessary resolutions, amendments to resolutions, amendments to amendments, and general debate. All of which was funny, very funny, indeed. But it was serious, too, and the outcome most satisfactory, because it showed that these men were all alive to the importance of the situation; they all have had more or less experience in society management, and in what may be termed practical politics, and it soon became obvious that very few resolutions would be passed without close scrutiny. Only one resolution was adopted which was contrary to the constitution, which is a wonderful improvement over previous records. And even this mistake may prove salutary, as its results are likely to make the members of future Houses of Delegates more cautious.

In spite of these facts, the actual work done by the House of Delegates was in the main well done, wisely done, and will redound to the credit of the association and of American dentistry. After one or two more sessions, when the constitution tinkerers will come to feel that they have soldered up all the leaky places, or when their confreres shall have grown tired of their constant plumbing, and when the delegates themselves shall have become accustomed to the working of the House, there is no doubt whatever that the National Dental Association will be a dignified, well-organized, smoothly running professional body, to which we all may lend our loyalty.



General Meetings.

The general meetings, held in the large auditorium, attracted crowded houses and attentive audiences. It was fitting that one of these meetings should have been given over to the report of the Research Foundation, but it was unfortunate that two important parts of their announced program were necessarily omitted on account of absence of the investigators. Nevertheless, this new branch of the association has made marvelous progress in a single year, and Dr. Price and his co-workers have earned a debt of gratitude from the profession at large and should have their financial support.

The third general meeting attracted a remarkably large attendance, in view of the fact that the subjects were purely medical in their nature, for which reason, perhaps, the fourth general meeting was the largest and most successful, the subjects relating to "Root Canal Treatment," by Dr. J. R. Callahan, and a prosthetic paper illustrated with moving pictures by Dr. William A. Giffin.

Section Meetings.

Many perhaps will report that again the section meetings have proven a failure, but such critics are but superficial observers. For the first time in the history of the association the section meetings proved successful, because, perhaps, only just now have we enough specialists in each separate department of dentistry to make such success possible. While, perhaps, no section meeting was packed with people, it is not the crowd that counts so much as the men themselves. Thus, when radiography was under discussion it was noted that the audience included noted specialists in this field, as well as numerous dentists who use the X-ray in daily practice. Before such men the essayist must ever be cautious in his assertions, lest he attract the criticism of those competent to criticise. A scrutiny of other section meetings discovered the same factors present. Therefore it is an easy prophesy that within a brief number of years the section meetings of the National Dental Association will be proportionately as well attended as are those of the American Medical Association.

Clinics.

Much credit is due to the managers of the clinics. There was a splendid showing of clinicians, with work that was worth seeing. The general

clinics were most entertaining, and distributed around a very large hall, so that crowding was absent. The progressive clinics were well attended and promptly and well conducted. One new style of clinic met with approval. This was denominated "Stereopticon Demonstrations." These were really a series of four lectures illustrated with the stereopticon, each limited to forty-five minutes. The audience remained seated and the lecturers appeared in succession.

The House of Delegates numbered about one hundred, and eighty-nine were present at the election of officers, another noteworthy fact. The following men were elected:

**Officers
Elected.**

President, Dr. Don M. Gallie, of Chicago; First Vice-President, Dr. Edw. G. Link, of Rochester, elevated to this position in recognition of his conspicuous services as Chairman of the Local Committee of Arrangements; Second Vice-President, Dr. Louis C. Dotterer, of Charleston, S. C.; Third Vice-President, Dr. E. E. Turner, of St. Louis; Treasurer, Dr. H. B. McFadden, of Philadelphia, and General Secretary, Dr. Otto U. King, of Huntington, Indiana.

A provision was added to the constitution by which the constituent State societies were allotted to districts, so that each district as nearly as possible might contain an equal membership, and from each of these districts one member of the Board of Trustees is elected. The new Board of Trustees are the following: First District, Dr. Waldo E. Boardman; Second District, Dr. H. J. Burkhart; Third District, Dr. Clarence J. Grieves; Fourth District, Dr. Thomas P. Hinman; Fifth District, Dr. Marcus A. Ward; Sixth District, Dr. J. P. Buckley; Seventh District, Dr. Thomas B. Hartzell; Eighth District, Dr. C. L. White; Ninth District, Dr. S. W. Wherry.

Exhibits. The exhibits occupying and filling a tremendous hall resembled a section of the world's fair, and proved one of the most attractive features of the week, the hall being crowded at all times.

Rochester is a beautiful city, a clean city, a hospitable city, and the association members who were present, about three thousand in number, were well housed, well fed and well entertained. All left for home with the kindest feelings toward Rochester and Rochester dentists.



Sudden Death of Dr. George Edwin Hunt.

As we go to press we learn with great distress of the sudden death of Dr. George Edwin Hunt. Dr. Hunt was widely known and as widely beloved by the dental profession of the entire world. He was more especially cherished in the hearts of the members of the Delta Sigma Delta Fraternity, in which order he has been an arduous laborer for more than a double decade. In that fraternity he was a Past Supreme Grand Master, and for fourteen years had been the editor of their quarterly journal, *Desmos*, from which position he had but just resigned.

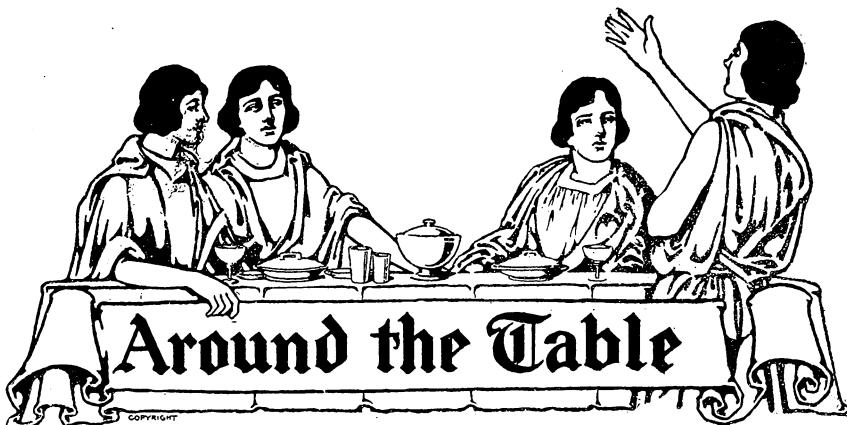
For many years Dr. Hunt had presided at the Delta Sigma Delta annual banquets, and he was again chosen for the post at Rochester, which, most prophetically, he announced would be his "Farewell Appearance." As toastmaster, Dr. Hunt presided with his usual genial and typically fraternal good humor, introducing the many speakers with wit and compliment. At the end, and entirely to his surprise, he was presented with a magnificent silver vase of Grecian design, with ornamentation and inscription in inlays of copper. He was much affected upon receiving this expression of goodwill and appreciation from his fraternity brothers, as were all those present in realizing that he was in a sense retiring from active participation in the work of the order. But none present dreamed that this indeed was his "farewell appearance," and it was a sad message which the telegraph carried over all the country announcing the demise of this much beloved man.

Dr. Hunt was perhaps most widely known in professional circles as the Dean of the Indiana Dental College, an institution justly proud of the record of its alumni, and so far as we know the only dental college in the country whose teaching staff devoted their time solely to their college work.

Dr. Hunt was editor of the *Indiana Dental Journal*, a live periodical while it lasted, and for the past few years had been editor of the familiar little magazine, *Oral Hygiene*.

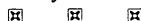
As a teacher and an editor it will be difficult to replace him. As a friend it will be impossible to efface the memories that ever will cling about the name "George Ed."

We extend heartfelt sympathy to the stricken wife, who was his most cherished possession.



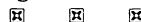
YES, INDEED, there were several Table Talks at Rochester. The following

- ❖ crisp remarks were caught by our official dictograph which we had installed at the Hotel Seneca. As no names were mentioned none can be repeated. Some folks are cautious that way. They have had their private wires tapped before. "Well," said one voice, a mellow Baritone, "it looks as though re-organization has been accomplished." "Which reminds me," replied a tender Tenor, "of an incident that occurred some years ago. There was a car strike in New York, and I was returning to my home in Brooklyn, when I started conversation with the driver. We had horse-cars then. He was telling me that the Brooklyn men would go on sympathetic strike, if the New York City railroad Barons did not soon relent, 'Because,' said he, 'eight hours is long enough for any man to work.' To which I replied, 'Oh! I don't know. I work ten hours a day myself.' 'Then you're not organized,' rejoined the driver, clucking to his horses. But as you say, we are organized now, and I wonder if that will shorten my hours any."



"YOUR LABORS will be lessened even if your hours remain the same," re-

- plied the Baritone. "But that will depend upon yourself. This great reorganized National Dental Association will study out and work out, create and invent, investigate and describe so many newer methods of technique and treatment that none but the dullard will fail to find his tasks easier, his work better, and his profession more alluring. I certainly have faith in this reorganized association, and I always have had. I remember down in Birmingham I overheard a prominent Eastern dentist declaiming against reorganization."



"REVISION, YES!" said he. "But reorganization, that is ridiculous impos-

- ❖ sible," he declared. "This body is large enough now. If it were larger it would be cumbersome, topheavy. I tell you reorganization is a mischievous, impossible proposition." "At which," continued the Baritone, "I was constrained to speak my little piece. Gentlemen of the East,"



Items of Interest

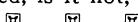
❖ said I, "Reorganization may seem impossible to you, but I can pick out
❖ a few men in Illinois, Indiana, and Ohio, and they will tear down, re-
❖ build, improve and modernize your little old alleged National Society,
❖ and paint it outside, decorate it inside, put a mansard roof on it and
❖ return it to you a magnificent new edifice. But why should these men
❖ do it? You would not know how to live in it after it was all done."



"BY THE GREAT HORNSPOOON," said another voice, "that was indeed a
❖ prophecy. I was over in the House of Delegates this morning, and some
❖ of those older men acted as though they had lived in shanties all their
❖ lives. They are so awed by the atmosphere of the House of Delegates
❖ that they do not say a word."



"THAT IS SOMETHING gained, is it not," asked the Baritone.



OVER AT THE POWERS' HOTEL I did not require a dictograph, being
❖ personally present most of the time. I chose that place to live in be-
❖ cause there were no politicians there. What did you say?



THEY CERTAINLY tried to get at the root of things in Rochester. Callahan,

❖ Rhein and Gillette presented important and most entertaining talks on
❖ root canal technique, while Eisen and others explained the values of radi-
❖ graphy. Again in the progressive clinic, Elmer Best demonstrated his
❖ method of entering, cleansing and filling root canals, all proven with
❖ radiographs.



THE CLOSING sentences of the splendid discussion of Callahan's paper,

❖ contributed by Gillette, made a marked impression. Not having the
❖ manuscript I cannot quote verbatim, nor can I hope to repeat his thought
❖ in language as choice as his; but as best I can let me give you his
❖ message.



GILLETTE in closing his discussion said: "The radiographers have con-

❖ victed the dental profession of gross incompetence in this matter of root
❖ canal filling, and the pathologists are declaring that to this faulty root
❖ work can be traced disease, chronic invalidism, and even death. And I
❖ say unto you, that even though these disasters occur long after you
❖ do your work; even though the sickness and deaths cannot be brought
❖ so directly to your doors that you may be punished for your sins; even
❖ though they may have been sins of omission; with this knowledge of
❖ consequences indicated to you as it now is, you cannot go on and remain
❖ blameless even in your own minds. Unless you perfect your technique,
❖ unless you fill root canals properly or not at all, in the future you will
❖ not dare look over your shoulders for fear of recognizing the gibbering
❖ spectres that will follow you about!"



AFTER THAT pleasant little prophecy I was not surprised to find Callahan

❖ buried ten deep in a crowd that was begging him to give again the
❖ formula and technique of using rosin in root canals. When I first noted
❖ the aggregation of men, each with his pencil and pad, for just an instant



- ❖ I was afraid that Callahan was giving the history of his life to the Associated and Local Press, but on second thoughts I knew better than to class him with those who let the newspapers tell the Dear Public what a Great Man he is.

■ ■ ■

SIDLING INTO the throng I soon discovered what it was these men were

- ❖ after, and in order to rescue Callahan I recklessly remarked: "Let him go boys, and I will print it all in the next talk 'Around the Table.'"
- ❖ Which you see was a promise, and being a promise must be kept, else
- ❖ Callahan will lose his life when next captured.

■ ■ ■

I MUST THEREFORE give you Callahan's technique, but first let me once more remind you that he does not fill the root with rosin. The rosin is, as he calls it, an "adjuvant." The solid filling is the gutta percha. There is also chloro-percha, but curiously enough no chloro-percha is introduced in the canal. It is *made* in the canal. Told quickly the method is as follows. First the rosin solution is introduced to seal the dentinal tubuli and to aid in sealing the apical foramen. Next a gutta percha cone is inserted, and this is pumped up and down. In this process two things occur. Chloro-percha is produced by the solution of the gutta percha in the chloroform of the rosin solution. At the same time the cone is slowly reduced in diameter by this solution, each pumping act driving it further towards the apex.

■ ■ ■

I RECALL that one gentlemen especially asked: "How can you get the thin solution of rosin up into a fine canal in an upper tooth." As he seemed to anticipate no trouble with lower teeth, I was tempted to suggest that for upper teeth the patient should be stood on the head. But we must not jest.

■ ■ ■

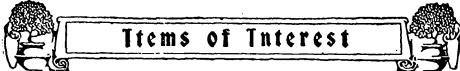
TO INTRODUCE the rosin solution into the canals of upper or lower teeth,

- ❖ use the finest of the Young Aseptic broaches. This broach is so constructed that it will retain the merest whisp of cotton twisted on to it.
- ❖ Saturate this with the solution and carry it into the canal. Then repeatedly withdraw and press in again this broach with cotton, this forming a syringe of which the canal is the barrel, and the broach and cotton the piston.

■ ■ ■

BUT LET ME quote Callahan's own language in regard to this technique:

- ❖ "The technique of the rosin gutta percha root-filling is simple, easy, quick, and sure to seal all tubuli and foramina that are open. To make the following technique possible a root-canal should be of the general shape of the fine paper root-canal driers as furnished us by the dealers.
- ❖ In addition to this general form, have the mouth of each canal a decided saucer shape. This will facilitate the placing of agents or instruments to or near the apical foramen. The first step then is, as nearly as possible, the complete dehydration of the dentin, using acetone, as advised by Dr. Prinz, as the dehydrating agent. After flooding the canal with acetone, use the paper points liberally until the canal is entirely free from moisture. Follow this with warm air. Then hold a



Items of Interest

- ❖ warm wire in the canal for a minute or two, being careful that the wire
- ❖ is *not hot enough to scar any part of the canal.*

■ ■ ■

"RIGHT HERE is where many root-canal operations fail. The canals and

- ❖ tubuli must be as dry as it is possible to make them, bearing in mind
- ❖ that it is possible to do damage by overheating the root. Now flood
- ❖ the dry canal with the thin rosin solution. Twelve grains of rosin dis-
- ❖ solved in three fluidrams of chloroform, is about the proper formula.
- ❖ Pump it in with a wisp of cotton on a broach. When the canal is full
- ❖ of the solution pass a fine wire or broach to the end of the canal. Work
- ❖ out all the air that may be trapped therein. This is of vital importance.

■ ■ ■

"SELECT A GUTTA PERCHA cone that is about two-thirds the length of

- ❖ the canal, holding the cone with a fine foil carrier. Pass the cone care-
- ❖ fully and surely about half way into the canal, pumping the cone up and
- ❖ down in the canal, usually from forty to sixty times, and as it dissolves
- ❖ in the chloroform, advance the cone farther toward the apex. The
- ❖ pumping motion forces the rosin solution farther into every opening.
- ❖ The chloroform at the same time dissolves the periphery of the gutta
- ❖ percha cone, which, becoming more and more attenuated, slips farther
- ❖ toward the apex, surrounding itself with a mixture of gutta percha and
- ❖ rosin. The rosin seals the tubuli and at the same time causes the gutta
- ❖ percha to stick tight to the pulp walls, and makes the gutta percha more
- ❖ stable and proof against the action of body fluids or substances. If this
- ❖ does not leave the large end of the gutta percha cone at or near the
- ❖ end of the canal, place a small cone along side or on the first one. Then
- ❖ with cold steel plugger points that will go into the canals, gently pack
- ❖ the mass into the canal, using warm air to soften the protruding gutta
- ❖ percha if necessary.

■ ■ ■

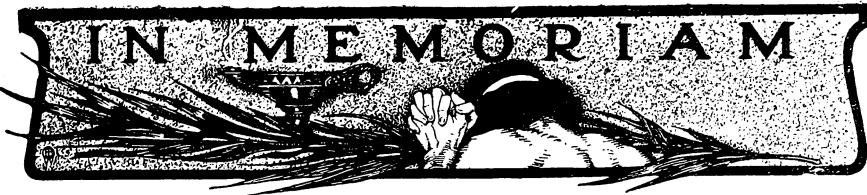
"THIS PACKING forces the semi-fluid (chloro-percha and rosin) into un-

- ❖ known canals and pockets, and at the same time brings the surplus
- ❖ chloro-percha to the mouth of the canal where it may be taken up with
- ❖ absorbent rolls of cotton. If this technique be followed it will be noticed
- ❖ that the chloroform has been used up or very nearly eliminated. In
- ❖ packing the root-filling with the steel plugger the rosin and gutta percha
- ❖ is inclined to stick to the plugger. This can be completely overcome by
- ❖ heating slightly the end of the plugger, then thrusting the instrument
- ❖ into a paraffin cake. The instrument will take up enough paraffin to pre-
- ❖ vent the contents of root-canal from sticking to the plugger point. Have
- ❖ on the bracket a small glass cap bottle which has been filled with chipped
- ❖ paraffin; the bottle is set in hot water until the paraffin melts down.
- ❖ When this has been allowed to cool we have a cake of clean paraffin
- ❖ enclosed within the bottle, useful in many ways. You may ask: "Do
- ❖ you succeed in filling *all* canals and tubuli to the farthest extremity?"
- ❖ "No, only those that are open and dry to the farthest extremity."

■ ■ ■

ON ANOTHER occasion I barely discerned Rhein completely surrounded

- ❖ by an eager mob of men asking questions about his technique. One
- ❖ particular query was in regard to the use of Schrier's sodium and
- ❖ potassium in root canals, and again I pacified the crowd with a promise
- ❖ to print. But I have given so much space to Callahan (not an inch of
- ❖ which do I regret) that I must ask indulgence until next month for a
- ❖ talk on sodium and potassium.



Dr. Frank L. Sibley.

Whereas, Our beloved member, Dr. Frank L. Sibley, has been removed from us by Divine Providence, it is fitting that we should make a record of his death and express our sorrow over the untimely close of a successful career; and

Whereas, By his genial disposition, estimable character, his skill as a practitioner, and his keen interest in the affairs of this society, he has been a credit to the dental profession; therefore be it

Resolved, That we, the members of the Rochester Dental Society, feeling deeply the loss we have sustained hereby express our appreciation of his friendship and our sorrow that he will never more meet with us in our social pastimes or professional activities; and be it further

Resolved, That these resolutions be spread upon our minutes, and a copy be sent to his widow, and to the professional journals for publication.

EDGAR F. LEWIS,

FRED M. ROOD,

Committee.





National Society Meetings.

AMERICAN INSTITUTE OF DENTAL TEACHERS, Ann Arbor, Mich, January 28-30, 1915.

Secretary, Dr. J. F. Biddle, 517 Arch St., N. S., Pittsburgh, Pa.

PANAMA-PACIFIC DENTAL CONGRESS, San Francisco, Cal., 1915.

Secretary, Dr. Arthur M. Flood, 240 Stockton St., San Francisco, Cal.

State Society Meetings.

MINNESOTA STATE DENTAL ASSOCIATION, Duluth, Minn., August 6-8, 1914.

Secretary, Dr. Benjamin Sandy, Syndicate Bldg., Minneapolis, Minn.

OHIO STATE DENTAL SOCIETY, Columbus, O., December 1-3, 1914.

Secretary, Dr. F. R. Chapman, 305 Schultz Bldg., Columbus, O.

WEST VIRGINIA STATE DENTAL SOCIETY, Huntington, W. Va., August 12-14, 1914.

Secretary, Dr. A. C. Plant, 802 Schmulbach Bldg., Wheeling, W. Va.